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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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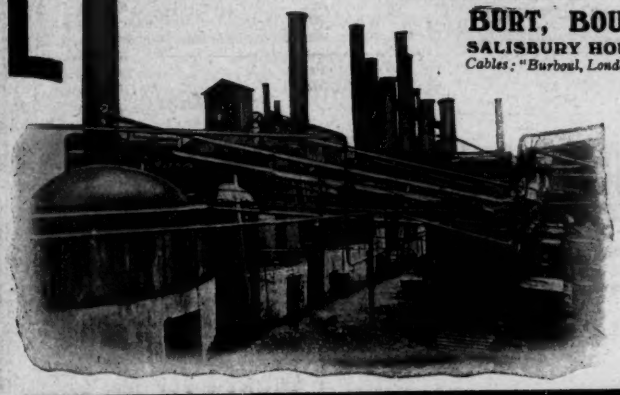

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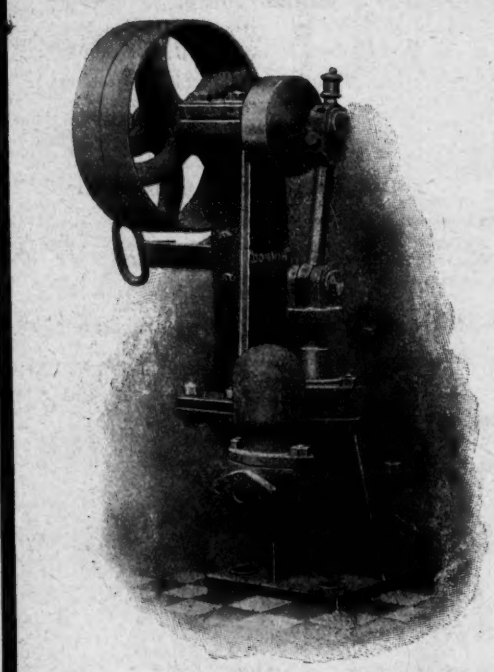

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VOL. CLXIX., No. 3225.] WEDNESDAY, MARCH 4, 1925. [77TH YEAR.

EDITORIAL NOTES.

Local Authorities and the Therm System.

It must be acknowledged that the Board of Trade have been extremely lenient with those local authorities who have not yet applied for Orders under section 1 of the Gas Regulation Act, seeing that two years after this came into force the Board had the discretionary power to issue compulsory Orders. Two-and-a-half years have passed since that power became effective; and therefore the local authorities who have not applied, and have no wish to apply, for Therm Orders must credit the central authority with having taken up a benevolent attitude in their favour. Throughout the piece the Board have shown a studied endeavour to bring about the transfer from one condition to the other in such a manner that the convenience of gas undertakings should be served. Now the time has arrived when what is obviously the intention of the Act, that the therm system shall be uniformly applied to statutory gas undertakings, should be brought to pass; and again there is ground for acknowledging the consideration of the Board in inviting the outstanding municipal and other authorities to send a representative deputation to the Board in order that they might learn actually what are the objections to being moved into line. Last Wednesday a deputation waited upon Mr. P. W. L. Ashley, C.B., Principal Assistant Secretary, Industries and Manufactures Department, and Mr. H. C. Honey, Director of Gas Administration. The deputation was led by Alderman F. S. Phillips, of Salford, who was strongly supported by Alderman J. H. Lloyd and Mr. A. W. Smith, of Birmingham, and others; and they were representative of the non-conforming local authorities who had been conferring the previous day regarding the lines of the case they should submit.

The members of the deputation were all men whom we highly respect, and who would not consciously take up any attitude which they considered would be detrimental to the interests of the industry. But reviewing the case that they put before the Board, it cannot be said that it was a strong one. That is not their fault. It is the fault of time and experience; and experience of the new circumstances brought about by the Act has weakened every suggestion it was possible for them to advance. The longer there is delay, still weaker will become the arguments. It was Mr. Smith who, in following Alderman Phillips and Alderman Lloyd, stated that the local authorities would have fought the new system at the time the Bill was introduced; but the financial position of gas companies was so bad that the local authorities were desirous of helping them. Had that fight taken place at the very genesis of the new system, experience to-day assures us that the case that would then have been put up by the local authorities would have had no reality or substance, but would have been purely hypothetical. Nevertheless, it is frankly admitted that the local authorities owning gas undertakings did do all that was in their power to assist in obtaining legislation which would relieve the gas companies of the financial hardships under which they were then struggling along; but the legislation affecting financial hardships was only embodied for convenience in that applying to the therm system, which was the outcome of a reference to the Board of Fuel Research as to the quality and conditions of the supply of gas. But the financial hardships as we then knew and felt them, having faded away, no longer need consideration. We have therefore now the therm system as the objective of the first part of the Act *minus* the financial hardships, and it is that, and that alone, which has to-day to be considered in relation to the outstanding local authorities. Their arguments can now be examined with pure disinterestedness in the light of a large experience in circumstances so varied that there is no case that is not fairly represented in that experience. Perhaps we might add, "save in mining districts in respect of the prescriptions as to pressure;" but it is within the judicial province of the Board of Trade to deal with exceptional circumstances in such manner as they may think fit.

In the course of the case presented by the deputation (as will be seen by our report), point was made of the "restrictions" imposed by the Act, while the industry wants as much freedom as possible. One of the very things that has appealed to our imagination and secured our admiration is the freedom that the Act confers upon the industry by relieving it of the previous tendency to inflict upon it, no matter the economic and local circumstances, an almost universal standard of value for its gas. To-day each undertaking under the Act has the power of declaring at any time, in any change of circumstances, the calorific value that will best suit it. The technical and economic freedom that this confers is invaluable to the future development of the industry, and to those engaged in the work of research with the view to progress. That is independent of the importance to the industry of getting its operations on a basis which, while conferring that liberty, at the same time secures the advantage (also of technical and commercial importance) of the means of making universal comparison—not merely in respect of gas prices, but in regard to types of plant, methods of working, coal values, &c. The potentiality of the therm is far-reaching. We are afraid some of our gas administrators have not viewed this matter from all aspects. They ask, What gain is it to the consumers? The gain to the consumers is of a varied order. The liberty conferred by the Act which removed restriction in respect of the value of gas per cubic foot is of incalculable present and prospective advantage to the consumer; and we see nothing in the report of the discussion at the Board of Trade or in the experiences of the past four-and-a-half years which in any way affects that view—a view formed by us at the time consideration was first given to the report of the Board of Fuel Research, which ended in legislation of such potency to the industry. Another advantage to the consumer is the fact that he has something definite upon which he is charged for his supply of gas. The 1000 c.ft. in Birmingham, Bradford, or Salford is not the same as the 1000 c.ft. in Little Peddlington and in better known places. A point which rather surprises us is that resistance to the therm system should come from some of the local authorities in industrial areas, where we are confident the technical men in industrial establishments would rather buy their fuel on the therm basis than per 1000 c.ft.—at all events that is an opinion formed by hearing the views of technical men who are engaged in such establishments in areas where the therm system has been adopted, and who are gradually tending

to the purchase of all fuels on the calorific basis, with an eye on constituents which are of negative use to them. Why continue to resist the inevitable?

This reminds us that the point was made during the interview that in the present condition of the secondary products markets, the unknown in respect of wages, the cost of coal, and so forth, the chances are that the price of gas will have to be raised to the consumers, and that therefore the present is an inopportune time to make a change to the therm system. Mr. Honey agrees (as we do) that the most opportune time to change from the volumetric to the therm system is when the price of gas is taking a downward course. In the past four-and-a-half years the recusant local authorities have missed many opportunities of introducing the therm system at the time of price reductions, and now they plead for the period of grace to be extended as long as possible. Their plea may receive consideration in view of the prospect of an upward trend in prices; but there cannot be indefinite procrastination. Those local authorities who adopted the therm basis in easier times will to-day have to raise their prices (let us say, for example) by a fraction of a penny per therm, while those still supplying by volume will have to increase the price per 1000 c.ft by a larger figure. It will amount to the same thing; but does it "seem" to be the same thing to the consumer? We have heard consumers say: "The charge for electricity has only gone up ½d.; the price of gas by 1d. or 2d." The incomparability is difficult to drive home where laymen are concerned. In every respect, too, there is greater security for the consumers under the therm system than under the volumetric one.

A point was made as to the difficulty that might arise in respect of testing in the case of an undertaking supplying in the districts of outside local authorities. No particular trouble in this regard has fallen upon undertakings already operating under the therm system; and in such cases the appointment jointly of a gas examiner has been suggested by the Gas Referees. In this connection, it may be said that the areas of outside local authorities have been supplied while an illuminating standard has been the vogue; and the consideration must not be overlooked that the calorific value of gas does not suffer so much in distant transmission as did illuminating power. In no area perhaps is the gas subjected to more drastic testing than in London with the testing stations spotted all over the area; and yet in London there is now close working to the declared calorific value. It is a notable feature of modern gas production practices that the calorihc value curve can be kept more even than was ever the case under the illuminating power standard. Then as to pressure, the point was raised as to the difficulties that would be encountered by many of the undertakings in maintaining the prescribed minimum pressure in every part of their area. There is experience—one important example is again London—where the distribution systems have remained in large areas undisturbed for years, and yet the therm system and the pendant conditions have been adopted. But apart from that the deputation, in respect of other matters, spoke of failing to discover the benefits of the therm system to the consumers. No expert will be prepared to say to-day that the minimum pressures prescribed according to the calorific value declared are higher than are requisite having regard to efficiency in use and the greater application of gas to domestic and industrial services. If owners of service-pipes (as in Salford) refuse to replace inadequate ones, then there is a case for giving powers to gas suppliers in the matter of the specification of pipes which will sufficiently and safely afford the supply required. Progress cannot be barred by the negligence and indifference of house owners.

What no doubt naturally strikes the Board of Trade as peculiar is that the difficulties recounted by the deputation should have concentrated themselves with such force upon the concerns which have not applied for an Order under section 1, while they hear nothing of similar difficulties from those who are working under such Orders, and many of whom have been doing so for a long time. The dispensation of adverse infliction has never appeared to our human natures to have been justly ordered; and reading the report of the discussion at the Board of Trade last Wednesday, something seems to have gone astray with the distribution of effects in operating under the Gas Regulation Act. How much is imaginary, and how much real? We glance over the load of accumulated and still growing experience; and we see no need to trouble ourselves by attempting to answer the question.

Gas Workers' Wages Dispute.

The latest information concerning the wages dispute in the gas industry is that the representatives of the workers' side of the Joint Industrial Council held a meeting last Wednesday at the House of Commons. It was, in the first place, reported by Mr. Hayday, M.P., that he had received no further communication from the employers. Inquiries have not been made by us; but we should assume from this that no further communication has been received by the employers from the workers' representatives. It is also learned that at the meeting delegates submitted reports from their Unions. These, it is stated, evidenced a unanimous feeling that, unless the employers were prepared to deal more favourably before the end of March with the claims of the workers, there would be a danger, in view of the intense feeling among the latter, of the Joint Industrial Council being dissolved. The notices to terminate the agreement expire at the end of March. On the 19th inst., the workers' representatives are holding a further conference, to which the executives of the Unions are to be invited with a view to formulating a definite policy.

One other matter. It has been necessary for the National Gas Council to issue a statement as to the events which have led to the development of the present situation, inasmuch as—through, we hope, misunderstanding—some misleading statements have appeared in the Press. The facts constituting the history of the matter are well known to our readers; hence there is no necessity to reproduce them. But an important point emerges which bears upon the views of the workers' representatives that because the claims they are now making were first preferred six months or so before any movement could legitimately be instituted to terminate the present agreement, those claims alone should go to arbitration—to the exclusion of those of the employers which were not made before the date at which notice to terminate could be given. The workers' representatives themselves admitted, when the claims were introduced in June last, that they could only be considered by courtesy of the employers; as a matter of fact, the workers' representatives had no right to make the claims at that period. All the employers are now asking is that the claims of both the workers and the employers should be decided at one arbitration, which is the only fair way to safeguard the interests of the public. Strangely, however, the Unions think that, because they attempted in June last to bring about an alteration in the covenant to which they were parties, and which covered an agreed period, they have now a right to say that those claims should be the sole subjects of arbitration. That is the position; and the attitude of the workers' representatives cannot be regarded as just.

The Gas-Fire and Low-Temperature Coke.

It is regrettable when a man in a position of influence takes up an attitude that to other people appears to be opposed to reason and facts, and may do harm to something of great public utility. We see that the Medical Officer of Health for Salford (Dr. H. Osborne) has again rushed into print, and the occasion for doing so, and the statements in his letter, can only convey—whether or not he intends it—to any disinterested reader an idea of animosity on his part towards the gas-fire, which is growing so much in popularity for its conveniences, efficiency, labour-saving, and non-smoke producing qualities. This gentleman seems to be ploughing a lonely furrow. The Smoke Abatement League of Great Britain has a mission divulged by its title. The Hon. Secretary of the League (Mr. C. Elliott) has incurred the displeasure of Dr. Osborne by writing to the "Manchester Guardian" on matters pertinent to that mission. The Doctor is apparently annoyed that Mr. Elliott should write as the Hon. Secretary of the League, because it may mislead people to think that the League endorses the views he expresses.

The annoyance is shown by this remark: "As a member of the Executive of the League, I can authoritatively state the League has not approved Mr. Elliott's newly-adopted rôle of champion of the gas-fire; also there are other members who do not agree that the chief function of the League is that of a medium for the organizing of gas advertising exhibitions. He rightly states that the great work before the League is the abolition of atmospheric pollution, due to coal smoke—particularly from domestic fires." And then follows this piece of pure assumption and foundationless prophecy: "Compared with this, the question as to which smokeless substitute will take the place of raw coal is of secondary importance, with this proviso: That persistent advocacy of a substitute which the public is not prepared to accept (for example, gas) must necessarily delay developments for a supply of smokeless fuel which the public will accept."

When Dr. Osborne states that the public are not prepared to accept gas as a substitute, he is saying something that is sheer nonsense, and a splendid testimony to a colossal ignorance on his part as to a very remarkable growth. The public are accepting gas-fires in largely increasing numbers, and every gas undertaking of importance has been fixing gas-fires as fast as their command of the necessary skilled labour will enable them to do so. If he has not heard of the public acceptance of gas for heating purposes, perhaps he has incidentally heard of the existence of the Gas Light and Coke Company. In 1924 alone that Company had an increase in the number of gas-stoves sold and let on hire of 85,322; and the tide of additional business in gas heating has been flowing with great rapidity throughout the country. The Governor of the Gas Light Company (Mr. D. Milne Watson) recently had the (shall we say?) boldness and audacity to tell the proprietors—"boldness and audacity" in view of Dr. Osborne's declaration that the public are not prepared to accept gas for heating—that in the Harley Street district, the home of the élite of the medical profession, more gas for domestic purposes is used per square mile than in any other part of London, though hardly a gas-light is to be seen there. How scandalous of the medical authorities in that area in view of what the Medical Officer of Health for Salford says!

There is a suggestion of omniscience in Dr. Osborne's assertion that the public would accept a supply of smokeless fuel—we take it he means a solid smokeless fuel produced by low-temperature carbonization. We have not observed any striking demand for such fuel; and how does the Medical Officer of Health for Salford know before the supply is available that the public will accept it? Has he any data which will show us that—with the low yield of gas by low-temperature carbonization and the prevailing poor market values of the other secondary products—the primary commodity could be sold at such a commercial rate that the public would accept it? It is idle to write as Dr. Osborne does in his letter in terms of generalization, altogether barren of supporting data. We will ask him two questions: What authoritative and direct evidence has he that the public are not accepting gas for heating? If he will supply such evidence, then we shall be able to tell the gas industry that its tales as to the increasing rate of gas-fire fixing, the flights of consumption on cold days, and the additional consumption that is being registered are all moonshine. The other question is: Has Dr. Osborne any positive evidence that the public would use solid smokeless fuel (produced by low-temperature carbonization) at a price which would make its production in all circumstances commercially profitable? We await his answers.

Miners' Wages Problem.

THE delegate conference of the Miners' Federation at Blackpool last week revealed two things—that the representatives of the men are fully conscious of the state of the industry's affairs, and that the districts entertain views as to what should be asked for in the way of additional pay which show a chaotic condition both in reasoning and as to the measure of the ability of the industry to provide more money for the satisfaction of the miners' claims. They wish to receive more, while unprepared to give a *quid pro quo* in the nature of a larger production per man-shift. Out of the imbroglio of opinion and proposals someone has to shape a scheme which will be acceptable to all districts. The delegates were obviously not in a position immediately to assist the Executive of the Federation in the matter of endeavouring to produce from the proposals a basis of negotiation for a new wages agreement, for a two-branched resolution was passed which instructed the Executive to remit to the districts the full list of the proposals, and empowered them to continue their investigations—presumably into the economic conditions of the industry—and to report to a further conference to be convened at as early a date as possible. The latter, it seems to us, holds out the possibility of the suggested joint conference with the owners being held to explore the whole economic position of the industry. If this proves true (the parties meet again to-morrow) then the issuing enlightenment should do much good. But the production from the variegated proposals of the districts of a basis of negotiation for a new wages agreement is a matter that is weighted with difficulty. It seems to us that it would have been much better to carry out the proposed joint investigation before any attempt was made to formulate a general scheme of demand for the whole of the districts. From one quarter we learn that certain of the regional proposals would add anything between 50 to 75 p.ct. to the present wage cost of production; and with average wages per ton of disposable coal at only two or three pence below 14s. out of a total cost of production of a little over 19s. per ton, the industry cannot stand anything of the kind if it is to continue to exist. One other point, the present minimum wage in the industry is 33⅓ p.ct. above the 1914 wage. Mr. Stephen Walsh's Bill to amend the Coal Mines Minimum Wage Act is now before Parliament, and the proposals of the Executive of the Miners' Federation as to the minima to be inserted in the Bill were unanimously accepted by the delegates. They were: Adult surface workers, 10s. per day; underground day wage men, 11s.; underground piece workers, 12s. Boys' wages are also dealt with. It is further desired to retain the District Minimum Wage Boards, with existing powers so far as they are not altered by the amending Act, and with authorization to vary minimum day rates or rates of earnings above the minimum set forth in the Act.

The Coke Competition.

Applications have been made for particulars regarding the coke competition in addition to those published in our issue for Feb. 18. The Editor will be pleased to answer any pertinent inquiries providing the nature of the information desired is given. This announcement is made because correspondents have sought "further particulars" without furnishing any indication as to what they wish to know.

Wembley Gas Exhibit.

Bearing upon the appeal made by the Presidents of the central organizations of the gas industry for funds for the British Empire Gas Exhibit this year, an article appears in the current number of the "Bulletin" of the British Commercial Gas Association by the Executive Chairman (Mr. F. W. Goodenough). In order to give it the largest possible circulation, we reproduce it in our columns this week, under the heading of "The Wembley Opportunity." Appended to it is a list of subscriptions promised up to the end of last week.

Gas Companies and Electricity Powers.

The Bill to facilitate the supply of electricity by statutory gas companies was, on the 24th ult., ordered by the House of Commons to be printed. This is the measure presented by Mr. Clarry, and it is strongly supported. It will be remembered that the measure proposes to authorize statutory gas companies to apply for Special Orders under the Electricity (Supply) Acts, 1882 to 1922, and to use their funds in the promotion of such applications. By such Orders the Electricity Commissioners may—subject, after consultation in each case with the Board of Trade, to such conditions, limitations, and provisions (including the keeping of separate accounts) as they see fit to impose or insert—empower any statutory gas company to apply their funds, and to raise capital or borrow money from time to time for electricity purposes.

Government Offices and Smoke Production.

Government Departments ought to set a good example by using smokeless fuel. But they do not. Oftentimes load after load of coal is seen in process of delivery at Government buildings; while in the House of Commons year after year a Smoke Abatement Bill is introduced. The other day Sir A. Holbrook asked the Under-Secretary of State for the Home Department (as representing the First Commissioner of Works) if he was aware that at 14, Buckingham Gate, the gas-fires are being removed. The premises have been purchased by the Admiralty as London offices for Greenwich Hospital; and the gas fires are being replaced by coal fires. Having regard to the efforts which are now being made for the abatement of coal smoke, the hon. member urged that the desirability of the premises being heated by gas or electricity should be considered. The explanation given is that the gas fires were removed during the negotiations for the purchase of the property—presumably by the person owning them. Central heating is to be installed, and coal fires will only be used "very occasionally." That is a very good case for the use of gas fires for local heating, and not coal fires. The Government should certainly recognize their responsibility in setting a good example in this matter.

A "Lucrative" Job.

For a highly accomplished man there is a lucrative job going at Neyland, Pem. The Urban District Council of that place appear to have remarkably crude notions as to the worth of an officer possessing a variety of qualifications of no mean order. The main occupations of the man they are seeking will be Sanitary Inspector and Surveyor. As sanitary inspector, he will be paid a salary of £110 per annum; and this will rise to £134, by annual increments of £7, £7, and £10. For the position of surveyor he will be paid £65 per annum, rising to £76 by annual increments of £3, £3, and £5. But that is not all. The person appointed will be able to add to his munificent income by acting in a supervisory capacity to the gas undertaking of the Council. It will, therefore, be no use anyone applying for the posts of sanitary inspector and surveyor unless the qualifications extend to gas manufacture, distribution, and utilization. For this supervisory work an additional remuneration of £15 per annum will be paid, or 5s. 9¼d. per week. A strong protest ought to be made by the ratepayers against such extravagance on the part of their Council. The gas profession will be injured to find that, in the opinion of the governing body of Neyland, their work is of an order which can be made incidental to that of a sanitary inspector and surveyor. The poor beggar (we hope there is not one) who is forced by circumstances to take this job will be in receipt of £3 13s. 1d. a week as a reward for his combined responsibilities. If they do not overpower him, and he can on his salary obtain sufficient nourishment for himself to keep going until he is in receipt of the maximum salary, he will then be getting £4 6s. 6½d. per week. We strongly advise intending applicants to ascertain first whether they can obtain work as road sweepers in the Borough of Poplar. There will be less responsibility, no technical qualification needed, and pay will be quite as good.

Labour in the Gas Industry.

Compiled from the 1921 census returns of England and Wales, a heavy volume of statistics has been issued by the Registrar-General, giving an elaborate reclassification by industries of the figures (already published) relating to occupations. Gas, water, and electricity undertakings are together credited with employing 162,767 persons. The trade unions concerned in the recent application for increased wages and additional holiday consideration for gas workers calculate that from 70,000 to 80,000 workers are involved. If this estimate be true, then the gas industry employs nearly as many persons as electricity and water together; and the whole of the employees of the gas industry are not included in the demands or calculation of the unions.

A New Alliance.

Strong efforts are being made to form a new industrial alliance wider than the famous Triple Alliance, which broke down so completely on "Black" Friday in 1921—to the satisfaction of the whole country other than the Miners' Federation. On the subject of a new alliance letters have passed between the Miners' Federation, the National Union of Railwaymen, the Associated Society of Locomotive Engineers and Firemen, the Transport Workers' Union, and the Amalgamated Engineering Union. The scheme comes from the Minority Movement, and has been described by Mr. J. H. Thomas as a Communist device to cause industrial trouble.

THE DUDDELL MEMORIAL MEDAL.

Presentation to Prof. Boys.

We referred, in the "Journal" for Feb. 18, p. 404, to the decision of the Council of the Physical Society of London to award the second Duddell Memorial Medal to Prof. C. Vernon Boys, F.R.S., and to the fact that Prof. Boys was unable to attend the annual general meeting of the Society on Feb. 13, for the purpose of receiving it, owing to illness. It is pleasing to record, however, that he had recovered at least sufficiently to attend a meeting of the Society held last Friday in the Physics Theatre of the Imperial College of Science and Technology, South Kensington, and to receive the Medal, which is awarded for the advancement of knowledge by the invention or design of scientific instruments, or by the discovery of materials used in their construction.

Mr. F. E. Smith, C.B.E. (President of the Society), who presented the Medal, said that the members were all delighted to know that, if Prof. Boys had not quite recovered his usual health and strength, he was, at any rate, in an advanced state of convalescence. Prof. Boys, he said, was one of the oldest members of the Physical Society of London. At one time he was its Demonstrator; subsequently he became its Secretary, and eventually its President, so that the Society owed him a very great debt. But the Duddell Medal was not being awarded to Prof. Boys for his services to the Society. He was receiving it because of the beauty and excellence of design of the instruments which he had produced for the advancement of science. Probably Prof. Boys' name was best known to the average scientist because of his work on quartz fibres. He it was who first conceived the idea of making exceedingly fine suspensions, practically free from elastic fatigue; and he had not only conceived the idea, but had invented the first method of producing quartz fibres. Exactly what physical science, or at least the measurements in physical science, would be to-day without quartz fibres, the President did not know; but one could certainly say that the precision of the measurements would not be so great. Prof. Boys had produced silica tubes, silica rods, and even silica vessels. He had invented the radio-micrometer, a beautifully-designed instrument which enabled the radiation from a lighted candle to be detected at a distance of three miles. In more recent years he had invented a calorimeter of exquisite design.

The Medal and accompanying Certificate were then presented to Prof. Boys, amid applause. The Certificate read as follows.

THE PHYSICAL SOCIETY OF LONDON.

Duddell Medal.

Awarded for the advancement of knowledge by the invention or design of scientific instruments, or by the discovery of materials used in their construction.

This is to certify that on the 12th day of December, 1924, the Council made the second award of the Duddell Medal to Charles Vernon Boys.

Prof. Boys expressed his appreciation of the honour that the Society had done him in awarding him the Medal for success in a branch of science in which he had always taken very great interest. He had known Duddell very well indeed. When one was concerned with the matter of delicacy in an apparatus, it was not sufficient to keep in mind only the idea of the extreme sensitiveness of the apparatus. Unless, with the increase of delicacy, one could at the same time remove all sources of disturbance of, and interference with, the working of the instrument, then the increase in sensitiveness, far from being an advantage, was the opposite. He described some of his own work in connection with the radio-micrometer and other apparatus, in order to illustrate this point. With regard to other things he had done, he said he was a mechanic, and had a geometrical sense. When he designed things, he kept them in a simple form, for he made them himself.

Southern Association of Gas Engineers and Managers.—As already intimated, the annual general meeting of the Association will take place on Tuesday, the 24th inst., at the Hotel Cecil, Strand, W.C., at 2.15, previous to which members will have lunch together. The new President (Mr. Philip G. G. Moon) will deliver his address, and other interesting items on the agenda include the election of Mr. W. H. Bennett to honorary membership, and the presentation of mementoes to Mr. Leonard J. Langford (the late President) and Mr. Bennett.

PERSONAL.

Mr. JOHN RUSSELL, General Secretary of Messrs. Brotherton & Co., Ltd., has been appointed a Director of the Company.

A carved oak chair has been presented to the Directors of the Kingston Gas Company by Mr. C. E. NUTHALL, the Chairman, who has also dedicated to the Company his portrait in oils, which was presented to him in 1919 by his Co-Directors.

Mr. T. REYNOLDS, of Stockport, has been appointed Assistant Gas Engineer at Blackpool, from among 67 applicants. He is 33 years of age, and received his training at Nottingham, where he spent 14 years. After the war he was appointed Second Assistant Engineer at Stockport.

The annual dinner of the London and Southern District Junior Gas Association to be held in the Abercorn Rooms of the Liverpool Street Hotel on Saturday next will be historic, on account of the fact that Mr. WALTER GRAFTON, of the Glasgow Gas Department, the first President of the Association (from 1902 till 1906), will be present to receive a testimonial from the Association in honour of that event. We understand that Mr. W. J. Liberty, an early President of the Association, has been the means of bringing this about.

The members of the staff of the Halifax Gas-Works met on Feb. 25 to present parting gifts to Messrs. F. A. C. PYKETT, J. WILSON, and A. COLLINSON, who have received appointments in different parts of the country. Mr. Pykett goes to Lancaster to take charge of the distribution department; Mr. Wilson has been appointed Resident Manager of the gas-works at Fleetwood, and Mr. Collinson Distribution Superintendent at Darwen. The presentation of a mahogany eight-day clock to Mr. Pykett, a Jacobean oak clock to Mr. Wilson, and a trouser-press to Mr. Collinson was made by Mr. W. B. M'Lusky, the Engineer and Manager. The gasfitters and other employees of the distribution department expressed their goodwill to Mr. Pykett in tangible form by handing over to him a solid leather suit case, pocket wallet, and mounted malacca cane.

OBITUARY.

AUGUSTUS FREDERICK BROWNE.

It was with a feeling of deep sorrow that we had to record in the last issue of the "JOURNAL" the death on Feb. 21, in a nursing home at Bromley, Kent, in his 75th year, of an old friend of everyone in the gas industry, Mr. A. F. Browne. His was a long and useful career in the gas industry, marked all through by a kindly manner and unselfish nature which made him loved by all with whom he came in contact. Ever mindful of the difficulties of others, he was always anxious to help in any possible way—a desire which was actively manifested on more than one occasion in connection with Junior Gas Association meetings.

Mr. Browne entered the service of the South Metropolitan Gas Company about 52 years ago, being engaged first in the Chief Engineer's office and the laboratory, and then having charge of the Rotherhithe Works, where he remained for seventeen years. He left Rotherhithe in 1899, to take up the position of Engineer at the Vauxhall Works of the Company, in place of Dr. Carpenter, who was appointed Chief Engineer of the Company on the death of Mr. Frank Livesey. This position he retained for fifteen years—in fact, until soon after the outbreak of war, when Major F. J. Bywater went on active service, and Mr. Browne (who had then about reached the retiring age) agreed to take over the charge of the East Greenwich Works during his absence. With great devotion to duty our late friend continued to bear the responsibilities of management at East Greenwich until after peace had been declared, and finally retired at the end of 1919, after 47 years' service with the Company; and, characteristically, he declined to accept any extra consideration in his pension on the ground of the five years that he had spent at East Greenwich, asking that this should be regarded as voluntary war work.

The opinion held by the Directors of the South Metropolitan Gas Company regarding Mr. Browne's long services was inscribed upon a silver salver (presented to him shortly before his retirement), in words which, as we remarked at the time, must have been a source of pride to him and to those dear to him: "Presented to Mr. Augustus Frederick Browne by the Directors of the South Metropolitan Gas Company as a token of their esteem and in remembrance of many years devoted and unselfish service, included in which was his management of the East Greenwich Works during the exceptionally difficult and anxious period of the great war." He was an extremely popular officer, always on the best of terms with his colleagues and the men.

In August, 1904, there appeared in the "JOURNAL" an article by Mr. Browne, who was at that time Engineer at Vauxhall, in which he gave an interesting explanation of a patent which had been applied for by him, in conjunction with Mr. Dean Chandler, for improvements in condensing and cooling gases, vapours, and liquids. The principal claim made by the inventors was for a "method or means for condensing and cooling gases, vapours, and liquids, wherein a current of air circulated naturally or by suitable means is passed into and out of a chamber in which water is evaporated by the heat of the liquids, gases, or vapours being cooled; the water being carried or circulated through the chamber by absorbent devices which spread within the chamber or upon the walls of it water supplied to them by gravitation or otherwise, or the water may be carried or circulated in the chamber in suitable receptacles and distributed by the agency of absorbent devices which offer by capillary attraction wetted surfaces to the influence of heat and of the air current, or the water may be supplied to the chamber in the form of a mist or cloud." Messrs. Browne and Chandler prosecuted their work in this direction, with the result that they produced an additional type of the "vaporizing" condenser.

Another invention—Browne and M'Kinlay's patent—which was described in the "JOURNAL" for May 2, 1905, had relation to an improved washing or scrubbing or enriching apparatus. In connection with this, the patentees explained that the definition of their invention was intended to include the effecting of chemical reactions or physical changes by liquid agents, by agents in solution, and by agents mechanically mixed or suspended in liquids. Continuing to glance through our volumes, we find in May, 1907, an illustrated abstract of a patent specification referring to "Browne's Vertical Retorts." This invention had for its object to employ the heat of the incandescent mass (or some of it) to ensure that the condensable products evolved from the upper layer or layers of fresh coal should be recovered or retained as permanent gas—"such retention being only possible when the evolved condensable products are subjected to sufficiently high temperatures for sufficiently long periods." The invention also had for its object to prevent the gas being subjected to temperatures which would be so excessive as to reduce unnecessarily the value of the permanent gases thus obtained.

A keen interest was always taken by Mr. Browne in the work of the Institution of Gas Engineers and of the Southern Association of Gas Engineers and Managers. For a period of four years—from 1902 to 1905—he was a member of the Council of the Gas Institute; and he was for some years Hon. Secretary of the Southern Association, besides filling the office of President in 1895. He retained his membership of both organizations until the end. Great interest was also taken by him in educational work, and he was for the three years 1906 to 1908 examiner in "Gas Manufacture" to the City and Guilds of London Institute. In the latter connection it was remarked in our editorial columns that, "if the young men who submitted themselves for examination were able to 'floor' satisfactorily the papers set them by Mr. Browne, they will have shown that theirs is a by no means superficial acquaintance with the details of gas manufacture and distribution." He was a warm supporter of co-partnership—which has been so successfully practised for many years by the Company with which he was connected.

We hope that for many years to come the gas industry will continue to have the benefit of the ability and enthusiasm of Mr. Browne's sons, all of whom are in the profession. They are Mr. Bernard F. Browne, M.Inst.C.E., who is Engineer and Manager of the gas, water, tramways, and electricity undertakings of the City of Santos Improvements Company, Brazil, and a Local Director of the Primitiva Gas Company of Buenos Aires; Mr. P. E. Browne, who is Distribution Engineer to the Brighton and Hove General Gas Company; and Mr. H. M. Browne, who is a member of the staff of the South Metropolitan Gas Company.

The Funeral.

A large number of old colleagues and friends attended the funeral, which took place at Norwood Cemetery on Wednesday last, to pay their last sad tribute of respect to his memory. His son, Mr. Percy E. Browne of Brighton, was present as chief mourner, with several sisters. A small son of Mr. Bernard F. Browne, of Santos, represented his father. Dr. Charles Carpenter, President of the South Metropolitan Gas Company, was there, and Mr. Philip Richbell, Employee Director. Among others noticed were Mr. Arthur H. Andrews (representing the Southern Association of Gas Engineers and Managers, of which Mr. Browne was a Past President and latterly an Honorary Member), who succeeded Mr. Browne as Station Engineer at the Vauxhall Works of the Company; Mr. J. F. Braidwood, who, before his retirement, was Engineer at Thames Street, East Greenwich; Mr. Frederick McLeod, General Manager; Mr. F. Day, Secretary; Mr. R. C. Macdonald, Mechanical Engineer; Mr. C. Richmond (Old Kent Road); Mr. Geoffrey M. Gill, formerly Chief Engineer; Mr. Layton, Editor of the Company's "Copartners' Magazine"; Mr. Walter Dunn, representing the Institution of Gas Engineers, of which Mr. Browne had been an honoured and distinguished member for many years; Mr. H. V. Corfield, representing the Brighton Gas Company; and Mr. D. T. Livesey, of East Grinstead.

The poignant and inspiring ritual of the service was impressively delivered by the Rev. G. Robinson Lees, M.A., late Vicar of St. Saviour's, Brixton Hill, now Vicar of Blean. Mr. Browne served for some years at St. Saviour's as Vicar's

Churchwarden; and Mr. Lees, in a short valedictory address, referred in eloquent terms of appreciation to the fine qualities his friend had displayed during their church work together. Those whom he was addressing could, he knew, testify to the integrity of the professional life of their friend—to those characteristics as an engineer which had won their admiration and regard. He himself had been privileged to sound the depth and to behold the beauty of his spiritual nature, his quiet unvarying desire, exemplified in all his religious associations, so to deal with all men that the term a Christian English Gentleman most fittingly described him. Such a life was never lived in vain. It set forth an example of true nobility. In the hearts of those who mourned that day remained a longing that in endeavouring to follow in their friend's footsteps they also might earn the love and esteem of those around them.

The death took place on Feb. 23 at Salcombe, South Devon, of Sir EDWARD THORPE, the distinguished chemist. He had lived at Salcombe for fifteen years. Born in 1845, Sir Edward was appointed Professor of Chemistry in the Aldersonian Institution in 1870. Four years later he went to the Yorkshire College, and in 1885 to the Royal College of Science. He was formerly Director of the Government Laboratories in London, and up to the time of his death was Emeritus Professor of General Chemistry in the Imperial College of Science and Technology, South Kensington. Sir George was the author of many books on chemistry. He was knighted in 1909.

ELECTRICITY SUPPLY MEMORANDA.

Two years ago, the London County Council passed a singular resolution. It was so much so that one wondered what had happened to this august and serious body of men that they should have even contemplated wasting the time of one of their Committees to consider and report upon it. The passing of the resolution, however, may be taken as confessing to an absence of exact knowledge of the subjects composing it. One of these was as to "whether or not legislation or other steps should be taken to secure that gas companies should not, as has been alleged, spread illness and death by poisonous fumes, whether as a consequence of imperfect gas or faulty mains or pipes inside and outside buildings." The very construction of that part of the resolution certifies ignorance of the matter. The other part was as to whether or not recent enterprise on the part of the electricity undertakings of Hackney, Poplar, St. Marylebone, Stepney, and Woolwich tends to show that gas is no longer necessary to the running of a house in respect of lighting, heating, and cooking. Those matters were referred for consideration and report to the Public Control and General Purposes Committees. The estimable members of those bodies were sent on a fool's errand. The first part of the reference has since been discharged. The second part had nothing to do with the Public Control Committee; and therefore the General Purposes Committee have reported. They have left much out of the report as to uneconomies of electricity; and it is evident that they have tried to steer a middle course. Perhaps, however, it may be said that the document is as good as one could have expected. But we must disagree entirely with the Committee that there is a general consensus of opinion that electricity is the best means at present available for artificial illumination. There exists no such "general consensus" of opinion. The Committee should go into Whitehall at night time, and, under the high-pressure lighting there, meditate over their statement. General heating by electricity is definitely stated by them to be prohibitive; but to please their electrical friends they say that for "occasional use" the electric radiator has marked advantages. We heard in the train the other night one victim of electric heating telling a friend (they were both perfect strangers to the writer) the story of his financial experiences this winter with electric heating; and the friend asked what else he expected. Electric heating is gaining for itself a reputation. The heating of water by electricity is also ruled out by the Committee, except "possibly on the thermal storage lines"—this again to please members of Borough Councils owning electricity undertakings. Electric cooker hotplates, the report states, cannot be regarded as so cheap or reliable as gas rings; but the electric oven offers "considerable advantages" over the gas oven. Exactly in what way the Committee do not say; and therefore they do not supply us with the opportunity for criticism. We wish they had. There are a few platitudes as to other domestic applications of electricity which do not concern us.

Conclusive, if not Exhaustive.

Housing and Dual Supplies.

Discussing the possibility of using electricity in housing schemes, the Committee call attention to what the St. Pancras Council are doing for electric lighting in some of their dwellings. Their method is to bear the cost of initial installation, and to charge the tenant so much a week for an unlimited supply, subject to safeguards to prevent abuse. Are the safeguards sufficient? Whether or not they are, the system cannot claim to be based on business-like principles. We guarantee there is not a single member of the General Purposes Committee who would be prepared to run a business of his own on the same lines. Nevertheless, in the opinion of the Housing Committee, proposals of this nature should be encouraged whenever possible. But somebody has got to pay for the installation of electricity; and why should this be when lighting can be obtained from the same pipes supplying gas for cooking and other heating purposes for which it is clear the Committee are not persuaded electricity can be economically used? There should be the fullest consideration for the pockets of the tenants of such houses; and dual services will not contribute to economy where one service would suffice for all purposes. The Committee prove this by references to three experiences as to installation costs. In the case of the Bellingham housing estate, the South Metropolitan Electric Light and Power Company offered to afford a supply of electricity for lighting purposes, at a cost to the Council of £19 4s. a house. The South Suburban Gas Company, on the other hand, offered to provide for a supply of gas for lighting and cooking free of cost. Had electricity been introduced for lighting and gas for cooking, the cost to the Council would have been £25 4s. a house. In the case of Roehampton, the cost to the Council of a supply from the County of London Electric Supply Company for lighting was £20 a house, against a supply of gas for cooking and lighting of £10 a house. Electricity for lighting and gas for cooking would have cost the Council £25 a house. At Becontree, the Ilford District Council were prepared to run service lines for lighting into each house free of cost to the Council. The Council would have had to wire the premises at a cost of £15 a house. For the introduction of gas for cooking only, the Gas Company required a payment of £27 10s., so that for electricity for lighting and gas for cooking, the total cost would have been £42 10s. a house. The cost of introducing gas only for all purposes was £22 a house. In the case of each of these estates, the introduction of electricity for lighting and gas for cooking, &c., was abandoned for financial reasons. No wonder!

Giving Householders What They Want.

It is supposed to be the privilege of a British householder to purchase for his home what he desires within the limits of his capacity for doing so; but some local authorities in connection with housing schemes have selected his lighting and heating arrangements for him. They do not pretend that they know better than the householder what he requires. His preference is nothing to them if they happen to be the owners of an electricity undertaking; even forced custom for the concern takes precedence of the householder's personal views. The Tottenham Light, Heat, and Power Company have had experience of giving the residents in the Wood Green section of their supply area gas or electricity just as they want it; and the experience is interesting. In the address of Mr. Henry Woodall to the proprietors of the Company at their recent annual meeting, he stated that the profit on the electricity business had increased by £1794, despite a reduction in price. Every house erected in Wood Green last year was supplied with gas and electricity. The Company give the consumers just what they ask for; and last year the business in both gas and electricity in Wood Green showed an advance—in fact, the increase in the consumption of gas in that district was greater than in any other part of the Company's area. Yet the number of new consumers of electricity during the year was 448. Since 1914 the laid cable has been extended from 10½ to 26 miles. Mr. Woodall says it is interesting and instructive to control both these sources of light and power. The information given certainly confirms that statement.

The Cooker that Wouldn't.

At times there are really candid letters in our electrical contemporaries on the subject of electric cookers. One has appeared in the "Electrician" from Mr. A. Plant, of Stockport. He has had a cooker of reputable make which proved a great disappointment—in fact, its refractory conduct was most reprehensible. When used for bread-baking the oven was turned on at "Full" for half an hour, after which the bread was inserted. After a reasonable time the top was done to perfection; but on the extraction of the loaves it was found that the sides and bottoms had not been touched. The loaves were replaced and left for much longer than is necessary with an oil-stove, but were still much underdone. In order to complete the process the loaves had to be turned over so that the sides were in turn displayed towards the top element. They then "browned;" but when they were later cut into, it was found that the inside was inedible. Two or three bakings of bread had thus to be discarded. Pies were similarly done—the top pastry to perfection but the inside and bottom pastry were uneatable. In further experiments, the result was always unsatisfactory—either the top was nicely cooked and the inside ruined, or else the time taken was unreasonably long. Mr. Plant blames the unsatisfactory behaviour of the elements at the bottom, which take too small an amount of current. At the top of the oven there is a heavy hotplate underneath which

is a 1500-KW. element. When the oven is being used for cooking, a large portion of the heat from the top element goes into the hotplate, and so is wasted. If the element had been divided into two of 750 KW. each, placed on each side of the oven, the results would, Mr. Plant thinks, have been more satisfactory. At the bottom are four elements—two on each side, and each of 300 KW.; thus the bottom heat is not as great as that at the top. In the more expensive stoves—costing about £20—a heavy cast-iron body of larger dimensions is given, usually with two boiling-rings and a hotplate with separate elements. The elements in the stove have a greater consumption; hence the results are more satisfactory. They are also better placed. For the cooker in question, £10 was paid. It is an extremely small one, ridiculously and uncomfortably low built, with a sheet-iron body. Mr. Plant says he would be more satisfied if, using more current, he was able to get more satisfactory results. Everybody, he submits, is not prepared to pay £20 for a cooker; and manufacturers are doing themselves and the electrical interests no good by fitting elements of inadequate consumption to the cheaper stoves. In his opinion, this accounts to some extent for the fact that electric cooking is not popular.

Intelligent Demonstrators.

It is a pleasure to learn that the "E. D. A." have arranged to staff "Electric House" at the Ideal Home Exhibition with men and women demonstrators thoroughly conversant with every application of electricity in the modern house, able to point out the difference between good and bad lighting, and correct and incorrect use of electric heat and power. The efforts of the demonstrating staff are also to be supplemented by other assistants who are able to answer questions with regard to electricity conditions, costs in use, &c. That is highly satisfactory, because our experience in the past at such displays has been very unsatisfactory. On one occasion, in conversation with a young attendant at a stand, he recommend a 1 KW.-H. electric fire for a room 14 ft. by 16 ft., until it was pointed out to him that it was not required for use in summer time. Then a 3 KW.-H. fire received an introduction; and he was asked what it would cost in cold weather in continuous use for (say) fourteen hours a day. It took him some time to inform us that at the price of electricity for heating in the writer's district—2d. per unit—this would mean 6d. an hour and 7s. per day and 49s. per week! The information was only forthcoming through patience and perseverance. At another stand, inquiry was made as to the efficiency of cooker hotplates; but that was a subject upon which no satisfaction could be secured. As a matter of fact, the attendant appeared a bit shy as to interrogations in that particular, and showed a distinct preference for running away from it and talking about the oven. At another stand there was an opportunity for inquiring into a water-heating system. The consumption of current was sought, the total content of the storage cylinder was ascertained, the temperature of the inlet water was given, and that of the water that would issue assuming none was drawn for a given length of time. The data supplied in reply to questions enabled a calculation to be made in a quiet corner. The result was 120 p.ct. efficiency! Therefore the water contained more heat than was put into it; and another miraculous thing was that that water-heater—assuming of course the veracity of the attendant was of an unimpeachable order—could not lose heat by radiation or in any other way. Because of these experiences, we are glad that the demonstrators at Olympia will be supplemented by "others able to answer questions with regard to electricity conditions, costs in use, &c." "The truth and nothing but the truth" saves much subsequent trouble.

Dimensions of Firebricks.

As a general desideratum it should be insisted that all refractory bricks should conform to specified dimensional limits. This conformity is imperative because, generally speaking, the cementing material is never as good as the brick, and poor shape necessitates the use of large quantites of cement. In a recent paper on "Refractory Materials," before the Institute of Metals, Mr. C. V. Faulkner strongly recommends that, if it is found impossible to obtain dimensionally-correct bricks from the suppliers, they should be ground to size. It may be objected that this is ridiculous on the score of cost; but if extra life is obtained, it is worth while, for a breakdown in refractories usually involves much more serious losses than mere cost of replacement. By "grinding to size" is not meant that they should receive machine-shop treatment, but that it should be accomplished by hand-rubbing with a harder type of brick. A carborundum brick is ideal for this purpose. It is insisted that no rocking or rolling must ever be permitted. It has been found that when brickwork has been glazed, or, in other words, when it presents a minimum of surface, it is the most efficient. In this condition it probably deals with heat and light waves by reflecting instead of absorbing them. To help the brickwork to get into this condition, it is suggested that it should be plastered with a refractory coating. These plastered refractories should be applied preferably in two coats, each of about one-eighth of an inch thick, and air-dried overnight in each case.

"ORGANIZATION AND ADMINISTRATION OF THE GAS UNDERTAKING."*

This useful little book contains in rather over one hundred pages the skeleton or framework of the subject-matter indicated by the title, and hardly a page or paragraph has been wasted.

In dealing with statutory and non-statutory gas undertakings, the author states that the non-statutory gas undertaking has no monopoly within its operating area, and possesses none of the protection granted to the statutory company. While this is literally true, it may lead the student to draw a wrong conclusion. Outside London no statutory gas undertaking has a monopoly, and the non-statutory gas company is invariably given some form of protection even when operating in the area of a statutory company; in fact there are many such examples (some much larger than the smaller statutory undertakings) operating in statutory areas with protective clauses, although in practice Parliament does not give statutory powers to more than one undertaking in the same area.

In dealing with the Gas-Works Clauses Act of 1871, it is stated that sections 28 to 34 (gas testing) are dealt with more fully under the Gas Regulation Act of 1920. The corresponding sections in the Gas Regulation Act go much further than this; they actually take the place of the above-mentioned sections; and any company operating under a section 1 or section 19 Order of the Gas Regulation Act is no longer governed by sections 28 to 34 of the 1871 Act.

The Model Bills and Clauses as such are dealt with in less than one page; and this would appear to be insufficient, seeing that the substance of most modern Acts or Orders is composed of Model Bill clauses. It is true that certain of the clauses relating to sliding-scale, auction clauses, and reserve and special purposes funds, are dealt with in a subsequent chapter; but it would have been better to form a connecting link between the chapters, or give some indication that the clauses referred to are Model Bill clauses.

In dealing with the reserve and other funds, it is stated that a company is not allowed a renewals fund; but this is not strictly correct. Though not in the Model Clauses, a number of sliding-scale undertakings have been given a renewals fund for the equalization of repairs. With regard to the reserve fund, the author states that the power is wider in a sliding-scale company than in a maximum-price company, but later he qualifies the statement by rightly observing that its operation is unjust. Presumably he means to imply that the amount of the sliding-scale reserve fund is unlimited, but its application is distinctly limited in so far as money voluntarily given up by the shareholders cannot be used for the purpose of paying back dividends, but can only be used to pay authorized dividends when the revenues are insufficient—*i.e.*, when gas is being sold at too low a price.

The chapters on costing are excellent, and deal with both the works and the district. Costing is defined as "a system of recording in accounts the materials used and the labour employed." In the chapter on works cost, the labour is dealt with fully, but the materials and stores might with advantage have been given a little more attention. In dealing with the district, both materials and labour are well covered in the limited space at the disposal of the author, but he has given his attention more to the fittings department than the district work proper. There is a gap between the works and fittings department which might have been filled by the addition of a few pages.

Unaccounted-for gas, rentals, and differentials are dealt with in a very satisfactory manner; and the method in which the ordinary and prepayment rentals are ascertained should be exceedingly serviceable to the student as well as to the officials. The fundamental principles of income-tax and rating are considered, and useful notes are given on such subjects as stock registration, certificates, transfers, and recording in every branch of the gas undertaking. There is a useful appendix giving a complete statement of accounts for a municipal undertaking, together with the corresponding tax assessment and Poor Law valuation.

As before mentioned, the only criticism which can be levelled against this work is that there is not enough of it; and it is hoped that in a subsequent edition the author will be encouraged to enlarge certain of the chapters, and give officials as well as students the benefit of his knowledge and experience. The criticism of inadequacy in treatment can always be found on any specific point according to the individual taste of the reviewer. The author is always faced with the difficulty of what to omit in order to keep the matter within the limits of the proposed volume; and with this in mind, the author has succeeded in producing a well-balanced book of real value. A perusal of the first edition will result in giving the reader an appetite for the second.

G. E.

* By Edwin Upton, F.S.A.A. Published by Sir Isaac Pitman & Sons, Ltd. Price, 5s. net.

Mr. William Morgan Lewis, who was Deputy-Chairman of the Cardiff Gas Light and Coke Company, left £406,853.

THE LAW RELATING TO PUBLIC SERVICE UNDERTAKINGS.*

[Reviewed by a Barrister-at-Law.]

The book under review—by Mr. F. N. Keen, LL.B., of the Parliamentary Bar—is based upon lectures delivered at the London School of Economics. In it, Mr. Keen has attempted (and succeeded most admirably) to present a survey of the legal position of public service undertakings. The scope of the work extends to undertakings dealing with water supply, gas supply, electricity supply, land drainage and irrigation, markets and fairs, hydraulic power supply, and other works.

Being based upon lectures, the book—as may be imagined—is not a dry legal treatise for practitioners, or a text-book for students, but it presents in a clear manner the fundamental considerations which govern the classes of undertakings enumerated, and in addition the general law relating to powers of undertakings generally. Following this plan in his lectures, and in this useful volume wherein they are reproduced, Mr. Keen first directs attention to the characteristics which distinguish public service undertakings from other corporations or companies, and describes how they obtain their powers or charters. Then in the succeeding chapter he analyses, in simple and understandable manner, the general law relating to the acquisition of land by agreement or by compulsion; and the summary which Mr. Keen succeeds in presenting may be commended to the attention of laymen and those for whom the subject has a practical interest. The principles governing the ascertainment of compensation are defined with clarity—with a useful outline on procedure—and the changes introduced by the Acquisition of Land (Assessment of Compensation) Act, 1919, are described.

In another chapter Mr. Keen summarizes—with equal success—the provisions of the Companies Clauses Acts, under which the raising of capital, the distribution of revenue, the internal management of companies, and their relation to shareholders, are (subject to any provisions of the Special Act) regulated. This chapter will be found a most useful guide to secretaries of companies. The questions of rating and income-tax form the subject of a separate chapter; and the outline of the law on the two matters, the former of which is (unless properly understood) confusing and complicated, results in making the principles and law clear to even the casual reader.

Another useful chapter relates to powers of statutory undertakers to make by-laws and regulations; and it is a most helpful summary which Mr. Keen has drawn-up. A matter of less use to the active and flourishing undertakings to which the "Journal" makes special appeal—viz., the gas industry—is the chapter dealing with sale, lease, winding-up, and cognate subjects; but it nevertheless completes the examination of the general law which Mr. Keen has made, before he proceeds, in the succeeding chapters, to deal with the particular law relating to the different undertakings—water, gas, electricity, and so on—to which reference has already been made.

As a book which will frequently assist administrators to obtain quickly a clear grasp of the principles involved in the many matters with which they have to deal, this work may be commended, particularly as its price (15s.) seems to be most reasonable, having regard to the labour and care involved in its compilation and production. There is no index, but instead a full table of contents has been compiled, by the aid of which the present reviewer has been able, without difficulty, to find the author's reference to any particular matter.

"The Law Relating to Public Service Undertakings," by F. N. Keen, LL.B., Barrister-at-Law. London: P. S. King & Son, Ltd.; 1925. Price, 15s.

Midland Association of Gas Engineers and Managers.—At the annual general meeting of the Association, to be held in the Grand Hotel, Birmingham, at 2.30 on Thursday, March 12, the incoming President (Mr. W. E. Caton, of Oxford) will deliver his address, and Mr. R. J. Rogers (Fittings Superintendent to the Birmingham Gas Department) will read a paper on "The Education of the Gasfitter; his Place in the Circle of Service."

Newcastle Chemical Industry Club.—We learn from the Hon. Secretary and Treasurer (Mr. A. Trobridge) that the library of the Newcastle Chemical Industry Club has just been enriched by the presentation of the last thirty volumes of the "Journal," suitably bound, through the kindness of Mr. A. B. Walker (the late Manager of the Howdon-on-Tyne Gas-Works. From the President, Mr. F. P. Tarratt (Engineer to the Newcastle and Gateshead Gas Company), downwards, there are a large number of members of the Club who are engaged in the gas industry, to whom the above acquisition to the library will be specially welcome. Further, the Club are always ready to place the books in their library at the disposal of non-members who may wish to make use of them for reference. At the close of the financial year (Jan. 31 last) the membership of the Club consisted of three honorary life members and 123 subscribing members.

SYNTHETIC ORGANIC COMPOUNDS.*

Reviewed by Dr. A. Parker.

Many branches of the synthetic organic chemical industry are closely allied, and consequently of interest to the gas industry. The number of synthetic organic compounds produced on a manufacturing scale is now so large that a full treatment of the subject would require several volumes, each written by a specialist in the particular branch under consideration. In addition to highly specialized treatises, however, it is important that books should be available for the purpose of enabling those technicians directly interested in one branch only to acquaint themselves with the progress made and the methods adopted in other branches. The experience gained in one section of an industry can frequently be applied with advantage in another section. The book under review should be classed as one which gives concise accounts of a number of branches of synthetic organic chemical technology.

The expression "synthetic organic compounds" has been used in the widest possible sense, by including substances obtained from the elements, such as tetrachlorethane, at the same time as viscose silk, which consists mainly of regenerated cellulose and hydrocellulose. The compounds considered include synthetic solvents, aromatic compounds, antiseptics and disinfectants, sweetening agents, dyestuff intermediates, tannins, explosives, warfare gases, artificial silk, celluloid, and synthetic resins.

The first chapter describes the recognized methods of manufacture of those chlorinated hydrocarbons used as solvents. Having explained present-day methods, the author proceeds to discuss future developments. In this connection, it would appear that, owing to the fact that these bodies are prepared from acetylene, carbon bisulphide, and alcohol, which are comparatively expensive, the question arises whether the solvents could not be prepared from cheaper materials. Methane would be ideal as a starting-point for these compounds, if it could be prepared of sufficient purity at a low cost on a commercial scale. The possibility of producing methane from water gas is then discussed. This will remind members of the gas industry of the paper presented to the Institution of Gas Engineers in June last by Mr. E. V. Evans and the South Metropolitan Gas Company.

In the chapter on other synthetic solvents, reference is made to the simultaneous cracking and hydrogenation of petroleum oils in the presence of catalysts; and the treatment of oils at suitable temperatures and pressures by the Bergius process is considered. A brief description is also given of the application of the Bergius process to the hydrogenation of coal. The methods of production of benzene and toluene from coal-tar oils, by the cracking of petroleum, and from sulphite turpentine, are described, and accounts are given of the preparation of solvents by the hydrogenation of naphthalene. Brief mention is made of the extraction of benzene from gas by means of activated carbon and silica gel—a subject which has recently been investigated by the Joint Research Committee of the University of Leeds and the National Benzole Association.

The antiseptics and disinfectants dealt with in the fourth chapter include phenol and its derivatives and the dyestuffs proflavine and acriflavine, on the antiseptic properties of which much research has been carried out during recent years. The fifth chapter contains a concise account of the methods of manufacture of sweetening agents, principally saccharin and dulcin. The starting-point in the manufacture of saccharin, according to modern methods, is toluene. The chapter on explosives deals with picric acid, "T.N.T." (trinitrotoluene), "T.N.A." (tetranitraniline), tetryl (tetranitromethylaniline), and hexanitrodiphenylamine.

It will readily be understood from the large number of compounds considered that, in a volume of 400 pages, it is impossible to treat the several subjects as fully as would be expected in specialized treatises. This was realized by the author; for in the preface it is pointed out that many valuable discoveries had to be omitted, in order to bring the book within reasonable limits. The necessary curtailment in certain sections is, however, compensated by the practice, which has been adopted throughout, of including references to original papers. These references should prove of value to those desirous of studying any branch more deeply.

The statement on p. 27 that methane occurs in coal gas in quantities varying from 30 to 40 p.ct., occasionally rising to 85 p.ct., requires correction or amplification, since it is misleading as it stands.

The volume forms a useful collection of recent information on many branches of industrial synthetic organic chemistry, and the diagrams are well chosen. The book is excellently finished; but if a suggestion might be made, it is that a reduction in weight would make the volume more convenient in handling.

* "Synthetic Organic Compounds," by S. P. Schotz, D.Sc. Tech., 412 pp., 110 diagrams. Ernest Benn, London. Price 45s.

THE WEMBLEY OPPORTUNITY.

By THE EXECUTIVE CHAIRMAN.

[Reprinted by permission from the "Bulletin" of the British Commercial Gas Association.]

The appeal for funds to make the Gas Exhibit at Wembley in 1925 as valuable an instrument of publicity for the industry as it was in 1924 has been issued, backed by promises exceeding £26,000. The word "appeal" is really the wrong one to use. The letter from the Committee, bearing the signatures of the recognized heads of the industry, is in truth nothing more, and nothing less, than a presentation to each unit in the industry of a fresh and splendid opportunity for serving itself by serving the common cause. No one is asked to subscribe money for the benefit of someone else. All that is pointed out to each is the existence of an opportunity for taking its share in the burden of a co-operative effort for mutual benefit.

There can be little if any doubt as to the result. The industry is acquiring the habit, because it has had ample experience of the results, of spending money upon co-operative enterprise. So far, it is true, it has done this on a very modest scale; though doubtless some may have thought they were "going it" apace when in one year (1924) they subscribed as much as 11s. per million to the common fund, of which 9s. 4d. was for publicity work. It may not be without interest and usefulness to see how such an expenditure compares with the advertising expenditure of other commercial enterprises. It is regarded as a by no means excessive appropriation for advertising for a firm to set aside 2½ p.ct. upon its turnover for expenditure under that heading. Taking gas at the moderate price of £150 per million, this would mean an expenditure on publicity of 75s. per million (not quite 1d. per 1000 c.ft.) per annum, or eight times the "record" expenditure on gas publicity in 1924. Allowing, as we must, for local expenditure on publicity of all descriptions bringing the total expenditure of the industry up to twice the amount spent through the national organization, or even to 25s. per million in the case of the most progressive undertakings, we still only reach one-third of what the average business house spends. Many of them spend at least twice as much, or relatively six times the amount expended by the most progressive gas undertaking.

Does anyone, who thinks the question out, seriously doubt that, if the industry regularly spent as much as 20s. per million on national publicity, and as much again upon local propaganda, the result would be such an increase in the sale of gas (and of the appliances and plant for its utilization and production) as has never before been seen, and such a strengthening of the goodwill both of the Press and of the public as would repay the industry its expenditure many times over?

The time will come, we are firmly convinced, and will come earlier than at the moment seems probable or possible, when we shall all look back with a smile upon the days when we hesitated about spending 6s. 4d. per million on national advertising (as we are asked to do in 1925), and shall be spending three times that sum or more, and knowing it is even then not as much as would bring profit to the spenders. We are only at the beginning of the work of making gas popular, of making the world realize by the educative medium of publicity that it is a living, growing, constantly progressive public service, and of bringing into reality the ideal, the practicable ideal, of smokeless cities whose standard and principal fuels are gas and coke.

Meanwhile, however, the industry is asked to provide 3s. per million (or as much more as it is willing to spend) on making Wembley tell the story of a world-wide industry, a great Servant of the Empire, having a thousand-and-one uses to which it can be put in the service of its citizens, alike in the youngest and most progressive countries, and in the homeland of its birth.

LIST OF SUBSCRIPTIONS PROMISED UP TO THE END OF LAST WEEK.

	£		£
Aldershot	105	London District (*continued*)—	
Bath	200	Lea Bridge	35
Bedford	40	South Metropolitan	2,475
Berkhampstead	5	South Suburban	525
Birmingham	1,000	Tottenham	500
Blackburn	145	Wandsworth	500
Blandford	3	Long Eaton	50
Bournemouth	250	Luton	90
Bradford	325	Lytham	25
Bridgwater	16	Maidstone	65
Bridlington	31	Newcastle	500
Bristol	500	Newport (Mon.)	75
British Gas Light Co., Ltd. (Hull, Norwich, &c.)	500	Northampton	100
		Oakham	2
Camborne	5	Oxford	75
Cambridge	105	Padstow	1
Cardiff	250	Plymouth	250
Carlisle	60	Portsmouth	328
Chester	60	Preston	125
Chesterfield	60	Ramsgate	25
Chichester	10	Reading	150
Coalville	6	Redhill	45
Colne	36	Rochester	125
Corbridge	3	Romsey	5
Cork	25	Rugby	52
Doncaster	50	Ryde (Isle of Wight)	25
Dorking	10	St. Albans	33
Dover	25	St. Austell	5
Eastbourne	52	St. Ives (Hunts)	2
Exeter	100	St. Neots	3
Exmouth	16	Shrewsbury	40
Falkirk	25	Southampton	175
Glasgow	1,410	Southend-on-Sea	50
Gloucester	75	South Shields	50
Grays and Tilbury	40	Stroud	28
Greenock	50	Sunderland	250
Guildford	25	Thirsk	3
Halifax	105	Tonbridge	30
Hampton Court	57	Torquay	50
Hastings	75	Truro	8
Hereford	10	Tunbridge Wells	65
Hexham	10	Waltham Cross	10
Heywood	10	Walton-on-Thames	20
Hitchin	10	Warwick	15
Ilfracombe	25	Wellingborough	50
Ipswich	125	Wellington (Salop)	20
Irthlingborough	6	Wells (Som.)	6
Leamington	50	West Hartlepool	75
Leicester	400	Weston-super-Mare	30
Lewes	5	Winchester	25
Lichfield	10	Wivelscombe	1
Liverpool	915	Wolverhampton	150
London District—		Worksop	10
Brentford	1,000	York	105
Commercial	500	Society of British Gas Industries (estimated)	6,000
Croydon	500		
Gas Light & Coke Co.	5,500		
Hornsey	50		£28,438

FUEL AND POWER PROBLEMS.

Discussion by Engineering Societies at Birmingham.

The Annual Joint Conference of the Institutions of Civil Engineers (Birmingham and District Association), Mechanical Engineers (Midland Branch), and Electrical Engineers (South Midland Centre) took place at the Birmingham Council House on Friday, Feb. 20. Dr. S. Z. DE FERRANTI (Hollingwood) presided over a large attendance of municipal engineers and surveyors, electrical, mechanical and chemical engineers, industrial chemists, and departmental heads from the Science and Technical Faculties of the University of Birmingham. The subject discussed was a "Review of the Work of the First World Power Conference."

The discussion was opened by Colonel R. E. P. CROMPTON, C.B.E., M.Inst.C.E., who said that power distribution of the future by electrical means from great generating centres would in enormous degree distribute industrialism from the crowded centres and eventually prove one of the greatest civilizing and humanizing elements of town and rural life.

Mr. D. A. BREMNER, O.B.E., M.I.Mech.E. (British Engineers' Association) referred to the rapid exhaustion of the coal supplies, and pointed to the need for more economical use. There was going to be a great increase in steam pressures and temperatures, and it looked as though the gas turbine might be made successful. The question of the low-temperature carbonization of coal was of peculiar interest. An over-riding consideration in connection with the development of power supply was security. The problem could not, or should not, be dealt with entirely on technical or economic grounds. In this country, where the natural source of heat energy was coal, they should think carefully before committing themselves too deeply to sources of heat energy which had to be brought from foreign countries. While Great Britain contained only 2½ p.ct. of the world's coal resources, it was producing 20 p.ct. of the world's production of coal. In regard to fuel oil, the British Empire produced less than 2 p.ct. of the world's output; and of the total quantity of oil imported into Great Britain in 1922, only 4·6 p.ct. came from the British Empire.

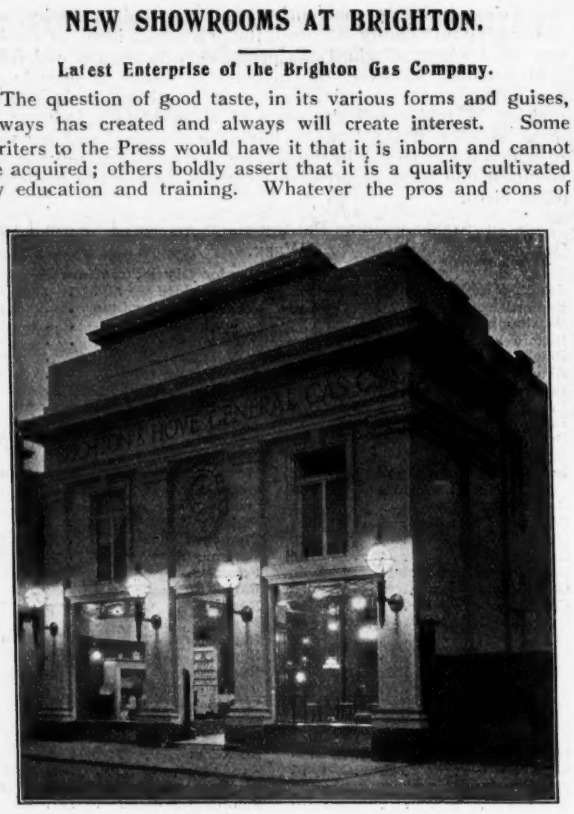
Mr. W. B. WOODHOUSE (President of the Institute of Electrical Engineers) said that electricity must be used as an economical means of transport; and it seemed there was complete agreement as to the limits of the economical distance of transporting electricity. He believed it was possible that some satisfactory means of treating coal would be found which would provide fuel for electric power as well as oil fuel, for which we were now dependent upon other countries. With a development of electrical undertakings which would result in the spread of the population over the country, the question would arise as to the economic provision of hot water for the people. There were possibilities for dealing with those demands in conjunction with a general power supply.

Dr. FERRANTI observed that in New York, which he had recently visited, there was, thanks to the generosity of the late Mr. Carnegie, a magnificent building which was the headquarters of the various engineering and scientific institutions. It was an excellent sign of the times to find the various branches of engineering residing together for the purpose of corporate work. He wished it were possible in London.

NEW SHOWROOMS AT BRIGHTON.

Latest Enterprise of the Brighton Gas Company.

The question of good taste, in its various forms and guises, always has created and always will create interest. Some writers to the Press would have it that it is inborn and cannot be acquired; others boldly assert that it is a quality cultivated by education and training. Whatever the pros and cons of



Exterior of the Premises at Night, showing the Novel Form of Lighting.

these views, it will be generally agreed that good taste is shown when the right thing is done in the right way and at the right time. It is with this idea in our mind that we say that the new showrooms of the Brighton and Hove General Gas Company have been executed in good taste. Thanks to the vigorous publicity campaign of the past two or three years, and particularly to the endeavours of the great "Wembley" year, the interest of the public has been awakened in regard to the value of gas. The iron of public appreciation has been heated; and now is the time for adding a little more fuel to the fire so that this appreciation may be moulded into keen and lasting enthusiasm. In opening new and extensive showrooms, then, the Brighton Gas Company have done the right thing at the right time. They have also carried out their project in an admirable

Basement Showroom, where the Heavy Appliances are Exhibited.

Cookery Lecture Theatre.

[This photograph does not give an adequate impression of the size of the room, which has seating accommodation for 175 people.]

and wholly commendable manner. The new premises are not merely pleasing and convenient; they typify the meaning of gas

VIEW OF THE MAIN SHOWROOM, THE RENTAL COUNTER, AND THE INGLENOOK.

service. It is just a hundred years ago that the Company came into active corporate being; and it is fitting that the centenary year should witness this new development.

ARCHITECTURAL FEATURES.

The new showroom, a fine stately building, is a decided acquisition to the architectural adornment of Brighton. The premises themselves have an interesting history. Originally they were a Presbyterian church—a striking building, in the Grecian style, notable for its two imposing Corinthian pillars on the façade facing the public street. They were then acquired by an oil and colour merchant, and went through a strange transformation. In the adaptation to commercial uses fanciful designs were employed in constructing a shop front—designs hardly in keeping with the Corinthian pillars and heavy cornice above. All this incongruity has been swept away by the Company, and what is practically a new building has been erected. The style is a modern treatment of the Renaissance, restrained and dignified, admirable in balance and proportion. The premises are centrally situated in Church Street, and though not in the main shopping thoroughfare are near important public buildings and within a few yards of the electric trams. Looking ahead, it is certain that any new building developments will enhance the value of the site.

THE EXTERIOR.

The Nautilus Fire Company, of Luton, are responsible for the design and entire construction of the new showrooms; and they have done the work well. Over the spacious entrance is a boldly carved medallion, carrying the arms of the Company—a piece of ornament which is thrown into relief by the broad simplicity of the walls, which are composed of a material which is a highly successful imitation of fine white stone. There are two large windows, effectively framed in white metal and dark " blue belgé " marble. The porch is floored with white " arabescato " marble. The exterior lighting is effected by

Cooker Exhibition Room on the First Floor.

four globe lamps by Messrs. Sugg and Co., each carrying 16 mantles, mounted on steel bronzed torchères, specially designed and executed by the Nautilus Company to harmonize with the architectural features of the building. It will be noticed from the accompanying photograph that the scheme is novel.

SHOW WINDOWS.

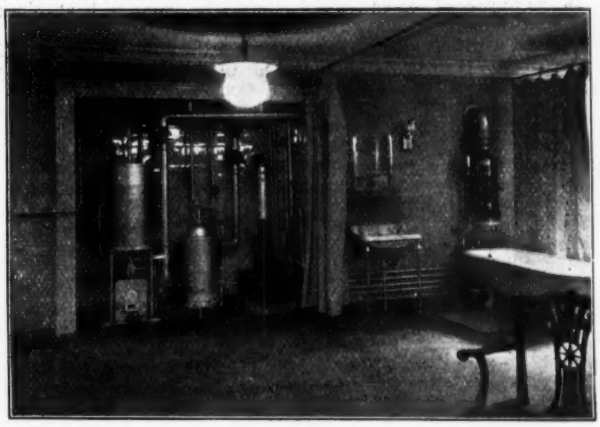
The Company have an excellent arrangement with a local furnishing company by whom they are supplied with suitable " props " for their various displays. At present one window serves to emphasize the cleanliness and convenience of an all-gas kitchen, and the other demonstrates the comfort and charm of a modern drawing-room fitted with artistic gas appliances. In the former there is a range recess tiled in " Vitrolite " and containing a complete kitchen suite—cooker, fire, and boiler. An interesting appliance displayed is a 1-gallon kettle on a hinged stand, manufactured by Wilsons and Mathiesons, Ltd.; and a wash boiler, a low-pressure iron, and a coffee roaster complete a convincing display free from that overcrowding which is still all too prevalent, in spite of the many endeavours to point out the futility of a jumble-sale atmosphere. A similar judicious selection has been made in the other window. In a delightful surround is a nickel-silver fire wholly in keeping with the tone of the room. A standard lamp and a 5-light pendant demonstrate good gas lighting. The general lighting of both windows is by Sugg's " Bon Marché " lamps fitted with opal cut globes. As indicative of the care which has been exercised in preserving an appearance of cleanliness and beauty, it may be mentioned that all the down rods to these lamps have been cased in white porcelain enamel.

THE MAIN SHOWROOM.

In what may be termed the main showroom, a worthy and successful effort has been made to identify gas lighting and heating with the modern demand of beauty coupled with hygienic efficiency. The result is, indeed, a reproduction of the general atmosphere which prevailed in the Gas Exhibit at Wembley last year. The walls are panelled in Austrian oak, and the floor is of oak boards. The rental counter is at the far end of the showroom, so that, to pay their accounts, consumers have to pass through the showroom. The value of this is generally recognized; so there is no need to stress the point. On one side of the counter is a small room, partitioned off, where the showroom manager may interview customers, if necessary. On the other side is an ingle-nook in which is fitted a " Cinderella " fire in a tiled fireplace. The lighting of this inglenook is by Evered's candle burners; and very effective it is. All the bracket fittings, with the exception of two " Flambeaux " lamps by Sugg, are by Evered, and each fitting is switch controlled. There are thirteen live grates in the main hall, demonstrating different tiled schemes, alternating between recessed and chimney-breast hearths. Among these grates—all excellent examples of modern production—is a hand-made register fire of beaten pewter, by the Davis Gas Stove Company. The lighting, which is indirect, is by Sugg's " Queen's " lamps; and all lamps in the showrooms are operated by distant control devices. The general decorations of the showroom are few and good. Real Turkey rugs, nothing but Doulton ware, an excellent suite of leather armchairs—all tend to the general effect of quality.

THE BASEMENT.

A wide oak staircase brings one to the basement, which is lighted by 4-burner semi-indirect lamps operated by distant control from the stairway. It is a bright airy room; and here again, though many heavy appliances are exhibited, there is no suggestion of overcrowding. The floor is of " Linolite "—a preparation of sawdust, cement, and other chemical—which, though hard and durable, is warm. Housed in the basement is a No. 10 Standard meter (by the Gas Meter Company) which measures the gas for the entire showrooms, and



Hot Water Section.

from which eight floats, separately controlled, are taken to different parts of the building. Neatly arranged is the series of cookers which the Company let out on simple hire—all of one type, and in seven different sizes. Then there are models of modern raised cookers by most of the leading makers, and a few examples of gas washing coppers. In Brighton there is a considerable and ever-growing field for the use of gas in the kitchens of large hotels; and there is naturally a representative selection of large cooking apparatus—vegetable steamers, hot closets and carving tables, stockpot stands, grillers, confectioners' ovens, &c. A tailors' iron stove was also noticed. It is here, too, that demonstrations are carried out to prove the convenience and efficiency of gas and coke for water heating. In a tiled recess three systems of water heating—a Keith "O.C." coke boiler, which does the main heating of the building, a Richmond 12-gallon "Hollar" boiler, and Potterton's storage system—are shown; and geysers are fitted over Doulton baths, by the side of which is a gas-heated towel-rail. It is interesting to note that there are live points, so that any appliance may be put into operation at will, and prospective consumers can see for themselves what any piece of apparatus can do.

THE FIRST FLOOR.

Further delights are in store on the first floor of the building, which is mainly devoted to a splendidly arranged cookery lecture theatre, where Miss M. Weston, M.C.A., and her staff demonstrate gas cooking to large and appreciative audiences three times a week. The seating accommodation, which is raised and disposed in the arc of a circle, is for 175 people; and it is significant that 200 interested gas consumers have been present at some of the lectures. On this floor, which in decorative style is in keeping with the main showroom, there is also a gas cooker exhibition room, where high-class apparatus are shown.

GAS FURNACES APPLIED TO THE STEEL INDUSTRY.

[Extracts from a Lecture given by Mr. Stanley A. Sears, B.Sc., Chief Engineer to the Selas Gas and Engineering Company, Ltd., of Manchester, to the Sheffield Society of Engineers and Metallurgists at Sheffield University on Feb. 23.]

Recuperation.

In connection with town gas plant, the volume of air required for perfect combustion is of the nature of 80 p.ct. of the total. Hence the usual practice of recuperating on the air only. As a rule, the additional outlay on plant for recuperation of town gas will not be warranted by the increased economy. On the other hand, the smaller percentage of air and the larger volume of gas in the case of producer gas renders it a sound commercial proposal to recuperate on both air and gas. When this is done, great care must be exercised to keep the air and gas flues isolated, to prevent loss of heat by pre-ignition caused through leakage.

In the case of low-temperature furnaces, cast-iron tubes carrying the air supply are frequently employed with great success—but only for low temperatures, as the life of cast iron is short when heated much above 700° C. in contact with hot air on one side and carbon dioxide on the other. Nickel chromium alloys stand up much better. The conductivity is about the same as cast iron, and remains uniform in use, as scaling is practically absent at 1000° C. Its one disadvantage is initial cost. In connection with high-temperature recuperation, flues made from carborundum have been successfully used up to temperatures of 2000° C. This material is highly refractory, has little or no expansion, retains its tensile strength at high temperatures, and has a specific conductivity equal to cast iron. It can be moulded into any form, and is easily built up by means of special cement, which, under the action of heat, binds the entire carborundum structure into a homogeneous mass.

When working at high temperatures, the scientific control of the furnace is of great importance. In the first place, there is naturally a limiting temperature above which a given fuel cannot work; and this is the theoretical flame temperature obtained by perfect and instantaneous combustion. Secondly, the rate of heat transference is proportional to the difference in temperature between the hot and the cold substances—that is to say, between the flame and the product. As the temperature of the product approaches that of the flame, the rate of transference becomes very small, as also does the quantity of heat available, which means that a larger volume of fuel is required to supply the necessary heat.

In the case of town gas, the flame temperature approaches the value of 3000° C., so that there is still a good margin of safety in furnaces working up to (say) 1600° C. With cold clean producer gas of a calorific value of 150 B.Th.U. per c.ft., the flame temperature approaches the value of 2000° C., showing a much smaller margin when working at 1600° C., but still sufficient to warrant its use when controlled scientifically, for the pre-heating of both gas and air raise the flame temperatures by the amount of pre-heat—that is to say, if recuperation is carried out to (say) 1000° C., the final flame temperature becomes equal to that of town gas working without recuperators. Whichever type of gas fuel is used, the perfect proportioning and pre-diffusion of gas and air are of such importance as to warrant a reasonable capital outlay.

In special cases, it is essential that the product be heated without coming into contact with the high flame temperatures or the products of combustion, which, at the high temperatures, may have a chemical or physical action upon the alloys. Furnaces for this class of work are of the muffle type.

The essentials for a successful muffle are:

(1) High conductivity.
(2) Strength at the working temperature, to prevent cracking or distortion.
(3) Uniformity in thickness, to ensure uniform heating.
(4) Application of fuel and air to give uniform heating to the entire muffle.

For ordinary temperatures, a nickel-chromium alloy may be used successfully, but care has to be taken in its design to prevent cracking and warping. For high temperatures, a carborundum refractory gives excellent results, as its specific conductivity is equal, if not higher, than the nickel-chromium alloy, and should any cracks occur, they may be made good with a wash of carborundum cement. This type of muffle will work satisfactorily up to 2000° C. In muffles, crucible furnaces, lead and salt baths, &c., where direct heating of the muffle, crucible, or pot, is of the greatest importance, the designer must bear in mind the essential physical requirements involved. In the first place, the muffle, crucible, or pot must be considered as cold relatively to the hot gases, and, therefore, as presenting a condensing surface which collects a substantial film of condensate consisting of carbon dioxide and water vapour, which acts as an effective insulation, and prevents the heat from being efficiently transmitted by conduction. To overcome this serious defect, the film must be constantly removed. This is best accomplished by the scrubbing action of the hot gases. It is obvious, therefore, that the fuel and air should be supplied in the correct manner—that is, with high velocity—and constrained to keep in good contact with the cool surface. This constraint is best effected by forming the combustion passage as narrow as possible. As the gases are to have a high velocity, they must either be led through tortuous flues to force them to remain long in contact, or else, in the case of round crucibles or pots, be forced to travel along a helical path by being delivered tangentially to the pot.

In many of the auxiliary branches of the steel industry, gas furnaces may be used with great advantage, notably in construction work.

Tyre-expanding plant may be admirably served by means of an adjustable gas furnace, which effects considerable economy in fuel costs, time of operation, and floor space, if arranged and controlled scientifically. The four large Railway Companies and many large private firms have adopted this form of tyre heating with very successful results.

The advantages or disadvantages of any system of heat treatment cannot be entirely translated into terms of £ s. d. Uniformity of product, freedom from scaling losses, convenience of operation, smaller floor space occupied, less attention required from the operative—all are of extreme importance, but cannot be stated financially. Solid fuel is cheap, but entails much additional labour in transport of fuel to, and ashes from, the furnace, in stoking, and in attention to the fire. The maintenance and repairs of this type of furnace are usually fairly high. It also entails large and valuable floor space being used for fuel storage near the furnace. The furnace is necessarily more bulky. The control of temperature is not sensitive. Much excess air is required for combustion, and, in consequence, for many operations a smoky flame is essential to protect the steel from the excess air which is bound to be present.

With gas fuel, there is no labour required for transport, no fire to stoke and clean, no dirty ashes, very low maintenance charges, the minimum of floor space, and the maximum of control. A smoky flame is not required when the furnace is scientifically controlled, because there is absolutely no free oxygen to scale the steel, and no hard scale is formed in a correctly designed and adjusted furnace. The adjustment is out of the control of the operative, who simply has to control the temperature by means of one valve only; the result being maximum uniformity of product. The working conditions of the operatives are so greatly improved that their efficiency, and therefore output, is raised.

It is difficult to express a comparison in actual costs between two fuels; but when the over-all production costs over a period are compared, it is found that gas furnaces of the best design, and scientifically controlled, come out better than solid fuel furnaces. A battery of three furnaces which were originally solid fuel fired, and working for 140 hours per week, consumed 26 tons of fuel (half coal and half coke) per week; average cost (say) 30s., or £39 per week. Three men wheeling coal and ashes, and stoking—that is, one man per shift—£10; total, £49. The floor space formerly occupied by the fuel is now occupied by furnaces. These same three furnaces are now worked with cold clean producer gas, and each consumes 6000 c.ft., or 9 therms, per hour. The actual cost of this gas is 4·75d. per 1000 c.ft., or 3·17d. per therm, which, for the same output of 140 hours for three furnaces amounts to £49 17s. 6d. No labour, greater cleanliness and control, floor space saved sufficient to instal double the number of furnaces, and reduced repairs are secured.

In comparing the figures for the older types of gas furnaces with the latest designs under scientific fuel control, I have taken an average of many furnaces which have come under my personal observation during the past ten years. A saving of 17 p.ct. is secured by altering the design and installing scientific fuel control. In this figure I do not include the further economies resulting from the addition of recuperators to many non-recuperative furnaces. Taking the case of a medium-sized furnace consuming 1000 c.ft. of town gas (at 2s. 2d. per 1000 c.ft.) per hour for 3000 hours per annum, this will cost in fuel charges £325 per annum. Of this sum, 17 p.ct. is £55, and the capital cost of installing the latest scientific control would be covered in less than the first year, showing a clear profit of over 100 p.ct. on the additional capital outlay. The running costs of an electric furnace, when compared with a gas-fired furnace of the muffle type, give figures which show that the fuel bill alone is frequently as high as 300 to 400 p.ct. of that of the gas furnace, and the interest and depreciation on capital expenditure are also very much more. It would naturally not be a correct comparison to compare a £100 gas furnace with a £500 electric furnace, but it is possible to construct a correctly designed and properly controlled gas furnace for much less than an electric furnace of equal capacity.

Alderman George Frederick Thompson, who was Deputy Chairman of the Dudley Gas Light Company, and a former Mayor of Dudley, left estate of the gross value of £46,583, with net personalty £43,737.

The twelfth annual general meeting of the Institution of Petroleum Technologists will be held at the Royal Society of Arts, Adelphi, on Tuesday, March 10. At about 5.30, Mr. Herbert Barringer, M.Inst.Mech.E., will give an address.

THE IDEAL HOME EXHIBITION.

MANY SUGGESTIONS AT OLYMPIA.

The Ninth " Daily Mail " Ideal Home Exhibition opened on Monday at Olympia, and we fancy the general view will be that the organizers have fairly succeeded in their aim to produce a display which in every way is an advance on the outstanding excellence of its predecessors. Perhaps also this year the attendance will beat the remarkable figure of nearly 400,000 visitors in three weeks which was attained in 1924. On the present occasion a number of new features have been included in the exhibition—which will remain open until March 25—and it is hoped that it will prove more than ever representative of that freshness of outlook and breadth of thought which have stimulated public imagination in previous years. The New Hall is again the scene of a wonderful exhibit of housing, and the gardens in the annexe are delightful. A section entitled Home Industries of All Nations was planned as the result of the success which attended the Hall of Handicrafts last year; while a series of Ideal Boudoirs constitutes a feature of the Toilet Section.

However, as time has not yet permitted of a detailed examination of all that is to be seen, it must suffice to deal in this issue of the " JOURNAL " with one or two of those displays in which our readers are particularly interested—leaving over until next week the completion of our notice of what is really a first-rate exhibition.

The London Gas Exhibit.

Once more gas is placed right in the forefront of the exhibition by a co-operative stand for which the eight principal London Gas Companies are responsible—namely, the Gas Light and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the Brentford Gas Company, the South Suburban Gas Company, the Tottenham District Light, Heat, and Power Company, the Wandsworth, Wimbledon, and Epsom District Gas Company, and the Croydon Gas Company. The arrangements were left in the hands of the following Committee: Mr. F. W. Goodenough, Gas Light and Coke Company (Chairman); Mr. A. Stokes, South Metropolitan Gas Company; Mr. L. F. Tooth, Commercial Gas Company; Mr. E. R. H. Wingfield, Brentford Gas Company; Mr. W. Wastell, South Suburban Gas Company; Mr. S. B. Chandler, Tottenham District Light, Heat, and Power Company; Mr. C. M. Croft, Wandsworth, Wimbledon, and Epsom Gas Company; Mr. W. J. Sandeman Croydon Gas Company; and Mr. E. W. L. Nicol, London Coke Committee—with Mr. J. E. Henwood as Hon. Secretary—and they left the design, erection, and equipment of the stand to the South Metropolitan Gas Company, who have right well responded

About 1600 sq.ft. of space is occupied by the stand, which is in an excellent position in the main hall, just at the foot of the large staircase leading to the gallery. The basis of the stand is a series of open rooms (in which are demonstrated the numerous uses of gas in the most up-to-date applications for the ideal home) surrounding a big central lounge, affording unrestricted access to the public, and approached by the main entrance through a miniature garden. The whole scheme, from the breadth of its conception to the minutest detail of its execution, is as great in its credit to the gas industry as it is bound to be in its attractiveness to the public. The rooms comprise hall, dining-room, bathroom, kitchen and scullery combined, nursery, bedroom, and study, and each is provided with appropriate gas fittings, and decorated in a highly artistic manner. The furnishing has been carried out in their usual good style by Messrs. Barkers, of High Street, Kensington.

The Lounge.—The lounge is lighted by ten specially designed wrought iron lamps. These, with the five wrought iron angle lamps outside the stand, and two standard lamps also outside, form an attractive feature of the display. The lounge is equipped with tables and chairs; and each table is lighted by a lamp on a china stand. Here visitors can sit down comfortably and discuss whatever aspect of gas may appeal to them at the moment. Two types of coke boilers are shown here—the " Glowworm " and the " Koke; " and " Classic " radiators of the National Radiator Company are assumed to be heated by these boilers.

The Hall.—A feature of the hall is the handsome " Metro " stainless steel gas fire, with the customary equipment of pilot light, ash tray, and standard tap fitted with a removable key. The section is lighted by " Metro " burners.

The Dining Room.—Handsomely panelled in oak of the Tudor period, the dining room is provided with a Richmond " Jacobean " gas fire in an old-fashioned chimney place. It is illuminated by " Metro " burners on two two-light and two one-light brackets, and a five-light pendant in bronze. The fittings are designed in Tudor period style, to harmonize with the room; and the general effect is most pleasing.

The Bathroom.—In the bathroom are a Ewart No. 2 " Lightning " geyser and a Ewart " Brilliant " water heater, in steel bronze, for supplying hot water to the bath and lavatory basin, which are also connected with a Potterton unit in the kitchen. The lighting is by Kempton burners, and there is a Main nine-radiant " Miranda " fire.

The Kitchen.—This, of course, is a highly important section of the stand, and is bound to attract additional attention by reason of the cookery and ironing demonstrations to be carried on. Here is to be seen a National Gas Council " Standard " one-level combination No. 3 oven and hotplate on high stand (to be replaced during the second half of the period of the exhibition by a Metro " Balham " cooker, complete with pilot light). Over the cooker is a conveniently arranged hood, to remove hotplate products of combustion and cooking smells. A Sugg 10-gallon " Marlboro " wash copper, with draw-off cock, will later be replaced by a Dean copper of the same size and similarly fitted. " Metro " and Davis " Crystal " gas irons are provided, with suitable connections and accessories; and there is a Parkinson six-radiant " Edmund " fire. A Potterton " Victor " No. 931 complete apparatus, with rectangular storage, in portable form, demonstrates the advantage of a properly constructed circulating and storage system. It embodies the latest type " H " series " Victor " boiler, No. 93 size, which is extensively utilized by the London Gas Companies for hire and general purposes. The lighting is by Brentford " Standard " burners, with fittings in Florentine bronze.

The Study.—The study, decorated after the period of Charles II., affords a striking example of the great attention that has been paid to detail, because the specially designed tiles for the fireplace have on them figures dressed in the period alluded to. The " Metro " gas fire is in lovely old gold finish, and on the walls are artistic " Metro " burners. Visitors to this room will be much struck by a gas candelabra. This simulates the real candle even to the occasional movement of the little flat flames. It is intended, not to illuminate the room, but purely as an example of decorative lighting; and from this point of view one can but admire it exceedingly. If a use for such a candelabra might be suggested, it would be in the chancel of a church.

The Bedroom.—Adam style decoration has been chosen for the bedroom, and the general effect is delightful. The Sugg aluminium burners, with oxidized silver fittings, are exactly suited to their surroundings. The fire is Wilsons & Mathiesons seven-radiant " York."

The Nursery.—This, with its quaint frieze, will prove a source of attraction to the younger visitors especially. The fire is a Fletcher-Russell six-radiant " Desmond; " and there is a ring burner for simple cooking operations. A feature of the nursery is the " Metro " nightlight, which consumes a therm of gas in 700 hours. The Evered burners, with oxidized silver fittings, have shades illustrating nursery rhymes—which, again, will make strong appeal to the young folks.

Placed in prominent positions about the stand are neat, and appealing, notices giving a brief description of the service that gas performs in the various rooms depicted, an account of the appliances shown, and the story of what a therm will do in the home. These give a last touch of completeness to a scheme that is artistic and well thought-out in every detail.

A feature of the arrangement is the sacrifice of space at one end to provide a public gangway, backed by a mirror which adds depth to the stand. On either side of the mirror is a large cartoon effectively displaying the names of the eight companies represented, so that visitors from any particular area covered by one or other of these companies may feel that in this exhibit they have something personal, and that in a way it " is their own show." The technical man, too, will be interested in the system of control, its easy access, and the positive manner in which the gas can be shut-off should emergency arise.

A Gas-Fitted Steel House

The South Metropolitan Gas Company have also interested themselves in another section of the exhibition. In the Village of Ideal Homes is a pair of steel workmen's dwellings designed by Mr. Telford, Managing-Director of Braithwaite & Co. Engineers, Ltd., of Victoria Street and Birmingham. One of these has been equipped with a " Metro " all-gas service for lighting, heating, cooking and hot-water supply by the South Metropolitan Gas Company, while the other is lighted by electricity and heated by coal. An examination of this pair of houses will in all probability lead the " Man in the Street " to two conclusions. The first of these is that the " steel house " is by no means as bad as it has been painted. As a matter of fact, a building of this character consists of steel outside, with a lining of asbestos—the two being separated by a buffer of air, with the result that the interior is both warm in the winter and cool in the summer. The second is that apparently the all-gas service in a house of this type gives the occupier an extra room, because in the all-gas house the living room is used solely as a living room (the cooking, wash boiler, and ironing appliances being neatly arranged in the scullery), while in the electric house the cooking is performed in a combination coal-fired oven in the living room. The all-gas house is in a fit condition, so far as its lighting and heating services are concerned,

to move into immediately. Rooms can be lighted or heated, water obtained for baths, food cooked, and ironing done—simply by the turning of a tap.

The all-gas house is lighted by "Metro" burners and fittings switch controlled. There are "Metro" fires and cooker, a "Metro" boiler for washing, and a "Metro" gas iron—and an excellent combination they make.

The hot-water requirements for both bath and sink are amply provided for by a Potterton "Victor" No. 51 complete set similar to that adopted by the London County Council and other Housing Committees. Being connected with a dwelling scheme emanating from the Midlands, where soft water is likely to prevail, copper cylinder and rustless boiler castings are adopted, giving immunity from discoloration by rusting. The installation is piped upon the "push-out" system, with control at both bath and sink, otherwise operated by Potterton's three-way valve to obtain a discharge at either point as may be required from time to time. The regulations of some water undertakings prohibit the connection of certain forms of gas apparatus to the rising main. The "Victor" system, however, does not come within this embargo, being of a permanently open type. It can therefore be connected to the rising main where roof cisterns are not installed.

The house is tastefully and appropriately furnished by Messrs. Oetzmann & Co., Ltd., of Tottenham Court Road.

And an All-Gas Bungalow.

The educational work performed on behalf of the gas industry by the South Metropolitan Gas Company in the steel house just alluded to is also carried on in a bungalow erected by the South-Western Appliances Company, Ltd., of High Street, Fulham. This bungalow, specimens of which may be found in many areas enjoying the advantages of a gas supply, is equipped to demonstrate what gas can do in a wood and asbestos building. It comprises living room, three bedrooms, kitchen, scullery, and bathroom; and it is fitted with "Metro" burners and fittings, controlled by switches. The living room—the only place where heating is available—is warmed by a "Metro" gas fire, fitted with a standard tap and ash tray. The kitchen contains a "Metro" cooker, with plate-rack and enamelled tray. To this a "Metro" pilot light has been attached—thus obviating the inconvenience of perpetually searching for matches, and always providing a ready light for hotplate and oven. A "Metro" gas-heated wash boiler and a "Metro" gas iron complete the equipment of the kitchen. The water for the bath is heated by a Ewart "Victor" geyser.

Attached to this exhibit of the South-Western Appliances Company is a motor garage, which is also lighted by the South Metropolitan Gas Company with a safety garage lamp, and is warmed by a Davis two-column safety garage heater.

(To be continued.)

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Visit to Arbroath.

The Eastern District of the Scottish Junior Gas Association paid a visit to Arbroath on Saturday, Feb. 21, visiting Messrs. Keith & Blackman's works in the forenoon and the Corporation gas-works in the afternoon. There was a gratifying attendance of members, despite the early hour arranged for the visit, and the long distances which most of them had to travel.

AT THE KEITH-BLACKMAN WORKS.

The party, about 35 strong, met at the James Keith Hall, adjoining Messrs. Keith & Blackman's works, and on arrival were kindly entertained to light refreshments by the firm. Mr. W. B. Davidson (Works Manager) welcomed the Association in the name of the firm. Before starting on a tour of inspection, the party showed keen interest in the splendid arrangements made by the firm for the welfare of their employees. The Keith Hall is used as a workers' club room, and the juniors were unanimous in their admiration of the excellent facilities provided. The billiards room, card room, and dance hall, as well as the reading and writing room, were inspected in turn, and a tour of the works was then commenced. Particular interest was attracted to the melting of non-ferrous metal by gas in the brass foundry, and considerable time was also spent watching the moulding operations before passing forward to the adjacent sheet metal department. In this department gas is used exclusively for heating rivets, and also for the heating of stamped plates. In the fitting shop the party had an opportunity of seeing Keith fans, Blackman volume fans, gas blowers and boosters, and gas cleaning fans in course of erection, and there were many remarks on the splendid finish of the appliances. An inspection of the machine shop, which is admirably equipped with up-to-date machine tools, and a tour of the well-stocked stores, completed an interesting and instructive forenoon.

Next the members adjourned to the Imperial Hotel, where they were welcomed by Councillor Sheriffs and Mr. Alexander C. Young (Engineer and Manager to the Gas Department), and entertained at luncheon through the kindness of the Corporation. At the end of the repast, Mr. R. LAING, of Brechin (the President of the Association), thanked Messrs. Keith & Blackman and Mr. Davidson for the visit, which had been thoroughly enjoyed by everyone, and also expressed the thanks of the Association to Councillor Sheriffs for his welcome on behalf of the Corporation. This was the first visit of the Association to the Arbroath Gas-Works, and in view of the low price of gas he was sure they would see something of considerable interest in the afternoon. Councillor Sheriffs and Mr. Young briefly replied, and the party started-out on their inspection of the gas-works.

THE CORPORATION GAS-WORKS.

There is nothing of ornamentation about the buildings, but all the manufacturing plant is substantial and in good order. The existing works are on the original site, but practically all the plant of 23 years ago has been replaced or added to. Consequently the general arrangement from the lay-out point of view is not what would be expected if placed on new ground. There is, however, plenty of room to admit of easy and economical working. The works are greatly handicapped by being almost a mile from the railway siding. On the other hand, the laying-down of new plant in the present position, rather than on an entirely new site, has resulted in very low capital debt at this date.

The vertical retort bench, which is on the Wilson intermittent continuous system, was erected by Messrs. R. & G. Hislop, of Paisley, and was put under fire in July, 1914. The coal used is coking or semi-coking nuts, and it is brought from the railway siding in a steam wagon fired with coke. The coal is tipped direct from the steam wagon into a receiving hopper, and from there it is elevated to the hoppers over the vertical retorts. There is no continuous moving machinery about the retort bench. Coal is led into the retorts by the opening of a plug valve, which allows of direct communication between the coal hoppers and the retort.

The retorts are continuously steamed at 30 lbs., through a $\frac{3}{16}$-in. nipple for each retort. The method of extracting the charge is extremely simple. The bottom mouthpieces of the retorts are closed and sealed by a swinging cast-iron "cradle" containing a water seal, and they are opened and closed by hydraulic power. When a retort is to be drawn, a bogie is placed below it and the cradle swung back. The charge in the retort falls into the bogie, which supports the whole weight of the coke and coal in the retort. By closing the cradle again, this column is sheared-off and the bogie load of coke is then wheeled out and tipped into the coke yard. A 24-in. gauge railway for these bogies completely encircles the retort bench, and allows of a bogie being placed below any retort, and also gives freedom to tip coke at any point along the platform overlooking the coke yard. By this means, an alternative method of coal and coke elevation is possible, in the event of a breakdown to the elevator, as the bogies can be filled with coal or coke and taken to the top of the retort bench in an electric hoist. They can then be wheeled along and emptied into any bunker as required. The gas produced per ton of coal is 15,000 c.ft. of 450 B.Th.U.

The sulphate plant attracted particular attention. It is by Messrs. Gillespie & Sons, and has a capacity of 30 cwt. of sulphate a day. To this has been added a 48-in. Broadbent centrifugal machine, for washing and drying the sulphate. This machine is driven by an attached horizontal steam engine, the connecting rod being connected to a crank on the driving spindle of the centrifugal machine.

The following items give an indication of the progress of the Arbroath Gas-Works since 1902:

—	1902.	1925.
Total meters in use	5800	6954
Coin meters in use	833	3970
Cookers on simple hire	127	*Nil*
Cookers on loan free	*Nil*	4171
Grillers and rings on loan free	*Nil*	2363
Gas fires and radiators on simple hire	*Nil*	846

The make of gas in 1902 amounted to 60,000,000 c.ft., and this year it is 182,000,000 c.ft. Gas is now being sold at 8·6d. per therm to ordinary consumers and 9·2d. per therm to coin meter users, with discounts for large consumptions, and there are special rates down to 7·6d. per therm for gas used for power.

At the close of the inspection, Mr. Young presided over an informal meeting in the office at the works, when many questions were asked and answered. The members were then hospitably entertained at tea by the Corporation, and subsequently returned to the Keith Hall, where an enjoyable time was spent until trains were due.

THE GRADING OF SULPHATE OF AMMONIA CRYSTALS.

A Convenient Laboratory Method.

By H. J. HAILSTONE, A.M.I.Chem.E.

Now that the manufacture of neutral dry sulphate of ammonia has become more general, the various main processes have been operating sufficiently long for adequate experience to accumulate in assessing their respective faults or advantages. This experience has been gained in a hard school; and though it is to be regretted that producers of sulphate have been handicapped by lack of technical information, the response to the call for the superior grade of material has been very generous.

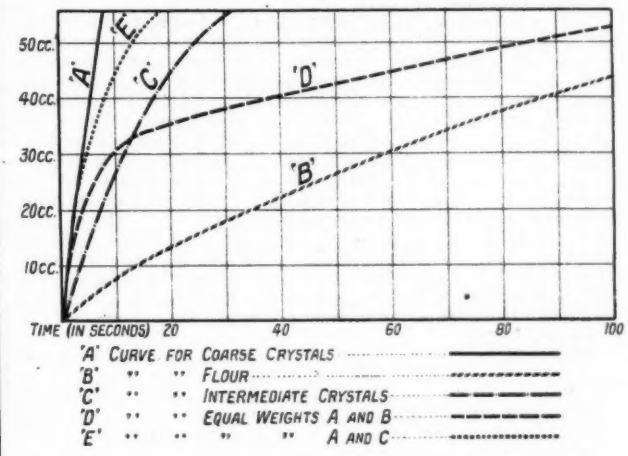
Good dry material is now being turned out by numerous plants, and such sulphate possesses an ammonia content of at least 25·6 p.ct., or (say) 21·1 p.ct. of nitrogen. Production of dry acid-free material thus being established, the next stage presumably lies in ensuring that the crystals are large and free from dust. This problem, which the industry has to meet, is a rather difficult one. Beyond the old adage of keeping the acidity of the saturator as low as practically possible, there has not appeared in our technical literature much useful information or guidance as to the method for producing at will in the saturator the crystals of desired size. The views of some of our leading authorities would be of immense value to the producers of sulphate provided they could give some really sound practical advice on this topic. Such information would be particularly appreciated by the smaller installations.

In the course of my reading during the last few years, I have repeatedly come across statements in the technical papers expressing a similar view. So far, however, the oracles have remained silent; and some unfortunate producers can produce little else but sulphate dust or "flour." Investigations on this matter are proceeding in various places, and it is anticipated that a suitable method for ensuring direct production of coarse crystals will shortly be available to the industry. At the moment, however, the object of this short communication is not so much to deal with methods for producing large crystals, but rather to describe a simple scheme for comparatively examining from this point of view the output of individual plants. It might be stated in passing that the grade or size of crystal most suited to agricultural requirements has not yet been defined by the industry beyond the general indication that dust or flour is disliked and "distinct" crystals preferred. This latter term is somewhat elastic, and a sample appearing as "distinct" to the keen eye of the youthful chemist would not necessarily rouse enthusiasm in the elderly sight of the merchant or user. It is high time some definite standard of grading was formulated. Makers would then be able to compare their own grade with that considered best "by the powers that be," instead of working more or less in ignorance of what really is most desired.

The standard method for grading according to size any dry mixture is, of course, the method of sifting through sieves of standard mesh and expressing as percentages by weight the proportion retained by each sieve. For daily routine application in plant control, this method is much too elaborate and lengthy; and the following scheme has been devised in order to obtain rapidly a rough idea of the nature of the plant output from day to day, and, if necessary, from hour to hour. It may be claimed to yield useful comparative results indicating the grade of crystals produced in any part of the process within a few minutes. In the manufacture of sulphate of this type, some such method of control is found to be advisable in maintaining an output of regular and good grade; and after trying out several methods, including that of microscopical examination, the following was found to give the most useful information.

The method is based on the rate of fall of small particles through a liquid; this being in accordance with well-known formulæ. It is seen that the time of fall for a given distance is governed by such factors as the size and specific gravity of the particles, and the density and viscosity of the liquid. In our particular experiments the specific gravity of the particles of sulphate is constant (being about 1·76), and the variables for the liquid are eliminated by using one liquid for all tests. In this instance, motor benzole is the most convenient, being manufactured or in stock at most sulphate plants. In the tests described its specific gravity was 0·868. Owing to the smaller particles taking longer to sink through a given depth of the liquid, observation of the time of fall gives a measure of the size. After adequate trial, the following quantities and conditions were adopted for control work; and though other workers may find it convenient in special individual cases to depart somewhat from my figures, I do not think any great improvement is to be anticipated. In my opinion, the method as it stands will fully meet the wide application required in the sulphate industry.

A small glass or metal measuring tube is cut down level at the top, so that it holds exactly 50 c.c. when filled to the brim. This is used as a scoop, and is loosely filled to the top with some of the sample to be examined; any surplus being removed by skimming-off level. Into a stoppered 500 c.c. graduated measure is put about 200 c.c. of dry motor benzole, and the measured volume of the sulphate is then added. The cylinder is gently shaken so as to remove air-bubbles from the crystals, and the stopper inserted after completely filling up with more benzole. The cylinder is now thoroughly shaken and repeatedly inverted, and is kept in motion in the left hand while a watch is held in the right. As the seconds finger passes the zero, the cylinder is quickly placed upright on a table; and the time taken for the sulphate to settle down is duly noted as each 10 or 20 c.c. mark is reached. This gives a number of readings which can be checked time after time by again shaking up the cylinder as before, and making fresh observations. The time figures for the various readings are then plotted on squared paper to a suitable scale, and curves are obtained which are characteristic of the sample tested. After a test, the cylinder is shaken and the entire contents turned out into a vessel where the sulphate may settle, and the clear benzole may be decanted off for use again. The cylinder only requires rinsing with benzole, and is then ready for a fresh test. The whole operation need not take longer than three or four minutes. In the diagram is shown the manner of plotting the data.



The curves illustrated are typical for the various grades of sulphate crystals. "A" is the time-fall curve for coarse crystals free from fines, and of uniform size. It is very steep and practically straight. "B" is a similar curve for sulphate flour, and this also is somewhat straight, but very much less steep. "C" is a curve for an intermediate mixture of rather small but "distinct" crystals, free from coarse particles and from flour. This is curved and of an intermediate slope. As will be evident, the slope of the resulting time-fall curves gives a good indication of, and is a reliable guide to, the nature of the mixture tested; large crystals yielding a steep curve, while smaller crystals give correspondingly flatter curves. The uniformity in size of crystals constituting any batch is indicated by the straightness of the lines. Thus, in mixture "A," where the coarse crystals are of similar dimensions, and in the "dust" "B," where the particles are approximately uniform, the lines obtained are almost straight. In case "C" there was greater variety of sizes of crystals making up the mixture, and hence this yields a line of marked curvature. To emphasize this phenomenon a mixture "D" was made up of equal weights of "A" and "B," thus being comprised of crystals of only two varieties—coarse and very fine. The effect on the resulting graph is most marked, for the curve is made up of one steep straight line merging into a flat straight line, thus confirming the constituents of the mixture to be large crystals and fine flour with no intermediates. Mixture "E" further illustrates this point, as it was made up of equal weights of "A" and "C," and hence the straightness and the slope of the lines are accordingly modified.

Tests made on this system afford interesting evidence of daily variation in the grade of sulphate, and enable the best conditions and precautions for producing large crystals to be demonstrated. Material may be selected at any stage of the manufacturing process, and after drying submitted to test for crystal size in order that the effect of each operation may be estimated. As the scheme gives only empirical and comparative results, I have purposely omitted details of sieve numbers and screening data for the crystals dealt with; but by using cylinders of uniform dimensions and fluids of constant specific gravity and viscosity, the time-fall results could be definitely correlated with sieve tests. Indeed, for individual works use, the chart should be first outlined with tests of mixtures of material which has been passed through definite sieves, thus giving a series of standard curves which afford a basis of comparison for future bulk tests.

In conclusion it should be stated that the acid-free sulphate to be tested must be dry, as otherwise a fictitious result will be obtained. It is useless attempting tests on so-called dry sulphate containing up to 1 p.ct. of moisture. There is no objec-

tion to replacing the benzole by petrol, crude naphtha, or other dry organic fluid so long as all later tests are made with liquid of the same specific gravity, as it is obvious that the use of lighter fluids will decrease the time of fall. There is no need to make any allowance for temperature variations within the range of ordinary room conditions.

THE USE OF THE BAFFLE IN FLUE PIPES.

By Frederick W. Dye, of Radiation Limited.

It is in flues from gas boilers (circulators) and geysers that the baffle or baffler serves a special and good purpose, though it has been known to do useful duty in flues from gas cooking apparatus also. With the gas boiler there are two distinct purposes which the baffler may serve, and which, as will be shown, makes it reasonable to say that every gas boiler should have this provision in its flue pipe. The general opinion is that the baffle is to prevent wind effects (down-blow) interfering with the steady burning of the gas beneath the water heater. This is correct, but it may be used to great advantage for a different purpose—viz., to prevent excessive flue draught reducing efficiency.

The experienced fitter, when about to instal a gas boiler, gives thought to the flue. It must be effective, or all his other work will probably fail. If a good kitchen chimney is available, he experiences a degree of satisfaction which is almost a relief—that is, if he is an experienced man who knows what trouble flues can cause. When a builder builds a house, he provides chimneys of height, size, and kind to suit his stoves. He has to consider this, and expend money on it which he could otherwise save. When the gasfitter comes to fit his stoves, he has to make use of whatever is allowed him, nothing whatever being provided specially for his goods. He is at a great disadvantage in many cases, while in all instances he or his stoves get the blame if things do not go perfectly well. Too commonly the gas heating appliance is supposed to be able to work without a flue, while in many instances it is expected to be effective with a faulty chimney—even with one which fails with a coal fire.

If the fitter of a gas boiler finds he can take his flue pipe into a kitchen chimney (one which has the range fire alight, if in winter only) he knows that the draught will be all that he needs, while the likelihood of down-blow is remote. It ranks as a thoroughly good chimney. It has to be pointed out, however, that the draught may be too good—that is, so strong as to make a rush of air beneath the boiler sufficient to have a cooling effect, and to disturb the even burning of the gas. Those who have experience of kitchen chimneys know how strong the draught is. On more than one occasion the rush of air has been seen to flatten-out the flames somewhat, which makes for a marked reduction in heating results.

The foregoing assumes that nothing is done to prevent the strong draught drawing through the burner chamber of the boiler; and it may now be explained how easily this can be dealt with. The solution lies in inserting a baffle (sometimes called a broken joint) in the flue pipe, as fig. 1 shows. There are appliances specially made for this purpose; but the arrangement shown answers quite well and has the advantage of being made up of stock goods, a bend and a tee. It will be seen that no obstacle is offered to the free passage of burned gases passing up from the boiler to the chimney, while the

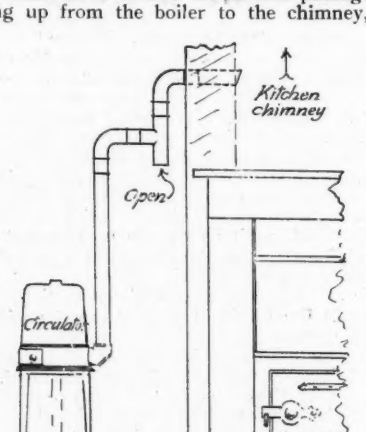


Fig. 1.

strong pull of the draught draws through the lower open end of the tee, not through the boiler. The draught, in pulling freely through this tee opening, only permits of a slight pull through the burner chamber of the boiler, just sufficient to carry away the burned gases effectually. The result is that the gas burns beneath the boiler steadily, giving its fullest heat to the surfaces intended to receive it; efficiency being at its highest at all times. It might be argued that a damper in the flue pipe could be made to have the same effect (as it could); but experience of dampers shows they are not used intelligently by servants.

The foregoing relates to the use of a baffle in a flue pipe leading to a good chimney; the object being to reduce draught. The following has to do wholly with the use of this device in dealing with down-blow when the flue pipe has to terminate where wind can have an adverse effect on it. When the flue pipe from a gas boiler cannot be taken into a brick chimney (one which has a fire at its base during the winter, or at all times) the pipe is usually taken through a wall, and turned up a little way outside; a conical cap being placed on top. Faith is erroneously put in this arrangement; some being known to express surprise at down-blow occurring when a cap is used. It is possible that a cone-shaped cap would offer some obstacle to the wind entering the pipe if the wind, when blowing from the troublesome quarter, simply pitched down on to the pipe end. Instead of this, however, the trouble is more often due to what may be better called wind pressure.

Let it be supposed that the flue pipe ends just through an outer wall, as shown in fig. 2; this point being about 10 ft. or more below the eaves of the roof. When the wind blows against this wall, either directly or nearly so, it meets a solid obstacle and has to get away somehow. While doing so, it develops a little pressure against the wall. This is not down-blow, but a pressure which causes the wind to accept the flue pipe as a hole in the wall, a simple hole regardless of the cap

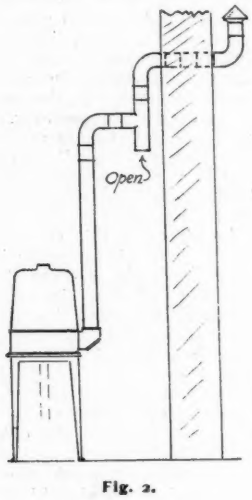


Fig. 2.

or any fancy kind of top that may be on the end of the pipe. The wind forces in, and, when inside, gives results the same as down-blow. This causes the trouble to be spoken of as down-blow in all cases, though the true cause may not always be the same. It has been said that a remedy lies in arranging that the outer end of the flue pipe be made to project some 3 ft. (when possible), so that its turned-up end and cap stand 3 ft. from the wall; this being supposed to bring the pipe end out of the area (close against the wall) where the wind pressure is felt. While this arrangement is a good one, and has often been successful, it has also been known to fail; and on this account it cannot be definitely recommended, though it may often be worth trying.

In fig. 2 it will be seen that the baffle is introduced to deal with the downward current of air in the flue pipe when the wind has this effect. As will be seen, the down-blow will exhaust itself through the lower open end of the tee-piece, and not get to the burner chamber of the boiler. As a rule, the gas burns steadily and does its heating work well, at a time when the wind may be doing its worst at the outside pipe end. This is the duty of the baffle when dealing with down-blow. The objection to the baffle, when used as fig. 2 shows, is that, during the time in which the adverse wind is forcing itself into the flue pipe, the burned gases from the boiler (much diluted with air) are delivered into the kitchen or room where the boiler is. If it is an apartment of good size, the effects will be bearable, though odour may be noticed. The burned gases, in volume, may not be greater than those from a gas cooking stove, which are borne without complaint; but if the place is small and unventilated, and possibly has a gas cooker at work in it, the fumes delivered by a baffle (when the wind is adverse) are not desirable. So far as is known, serious hurt has not been occasioned by this; but serious complaint has —and this should be avoided.

With the very small unventilated kitchens of much modern property now being erected, no chimney is provided; a gas cooker being installed for cooking, and a gas boiler for the hot water. The flue from the boiler is usually a pipe carried through the outer wall. There is no flue to the cooker. With instances like these—and in all possible cases—it is a commendable plan to carry the outer pipe up clear above the eaves

of the roof, as in fig. 3. This probably does not entail more than 10 ft. of additional pipe; and if asbestos composition pipe is used, the possibilities of success are increased. Two houses of a row, equipped like this, were examined after four months' winter tenancy, and the tenants gave assurance that no wind troubles had been noticed, though in these two instances the flue pipes were not fitted with baffles (a practice not to be

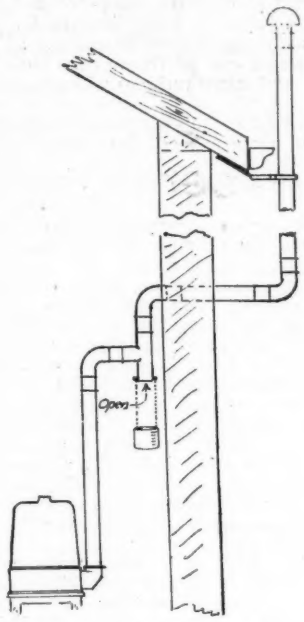


Fig. 3.

recommended). The houses were distinctly exposed to weather effects, but there were no higher buildings near them. In the ordinary way, it is considered that a chimney, to be free from down-blow, must terminate at least 4 ft. above the highest ridge (not the eaves) of the roof; and a glance at any building will show that builders carry their brick chimneys to this height, the object being to avoid ill wind effects. It is, however, a fact that a small pipe flue from a gas boiler carried about 2 ft. above the eaves is commonly effective (though it cannot be guaranteed, and a baffle should be provided, as fig. 3 shows).

It will be noticed in figs. 2 and 3 that the baffle is placed at a fair height above the boiler. There are two reasons for this. The first is that, if burned gases are discharged, even in small amount, it is better that they be overhead. The second reason is that, there being no brick chimney, what draught is relied on to carry up the burned gases from the boiler has to be created in the flue pipe; and it is desirable to have about 4 ft. vertical from the boiler before the baffle is reached. The baffle is a break in the pipe, and what draught is obtained is created between the boiler and the baffle.

In fig. 3 it will also be noticed that a cup or can is suspended beneath the lower open outlet of the tee of the baffle, this being a provision to catch condensed water. It follows that with an external flue pipe of any length—and sometimes with an internal pipe—the water-vapour of combustion is partly condensed, especially in cold weather, and this, running down the pipe, drips from the open end of the tee. The cup should not be too near the tee, or it may interfere with the discharge of wind if down-blow occurs. It is not always needed.

As stated at the beginning of this article, there is good reason for introducing a baffle in the flue pipe of practically every circulator installed. It applies in the instances already described, and equally so if the pipe discharges into a roof. The use of the baffle with a geyser is too well known to need amplification.

Institution of Engineers-in-Charge.—The twenty-fifth annual dinner of the Institution will take place in the Venetian Chamber of the Holborn Restaurant on Saturday, April 4. At a meeting of the Institution to be held at 7.30 on March 11, at the St. Bride Institute, Fleet Street, E.C. 4, Mr. E. H. Field will read a paper on "Developments in Ammonia and Carbon Dioxide Compressors."

Manchester District Institution of Gas Engineers.—The annual meeting of the Institution will be held at the Midland Hotel, Manchester, on Friday next (March 6). During the morning a visit will be paid to the works of West's Gas Improvement Company, Ltd., at Miles Platting; and in the afternoon Mr. F. H. Robinson, of Harrogate, the incoming President, will deliver his Presidential Address.

MIDLAND JUNIOR GAS ASSOCIATION.

There was a representative attendance of members of the Midland Junior Gas Association at a meeting held at the Birmingham Council House on Friday, Feb. 27—Mr. HARRY CLARK presiding.

A cordial welcome was extended to Dr. E. W. Smith, of London (formerly Chief Chemist to the Birmingham Gas Department). Those present included Dr. Walter (Head of the Industrial Research Laboratories of the Birmingham Gas Department) and Mr. T. F. E. Rhead (Chief Chemist, Birmingham Gas Department).

WASTE-HEAT AND GAS-FIRED BOILERS.

By JAMES W. REBER, M.I.Chem.E. (of the Research Section of the Woodall-Duckham Companies).

[EXTRACTED.]

Most of the recent carbonizing plants have been provided with waste-heat boilers, and it can be assumed that in future this will become a standard practice. The question of their installation for existing carbonizing plants depends on the temperature of the available combustion products, on the lay-out of the plant with regard to the available space, and the necessary connections to the waste-gas flue. There are, however, very few instances where the erection of a waste-heat boiler is not possible from a constructional point of view. In many cases the engineer is of the opinion that the temperature of the waste gases in the main flues is too low to be of use for steam raising, merely because the main flue shows hardly any colour, though measurements taken with a pyrometer may show a temperature of 800° to 900° Fahr. The amount of steam raised from waste gases at this temperature, with a fuel consumption of about 15 lbs. of coke per 100 lbs. of coal carbonized, will be about 500 lbs. per hour per ton of coal carbonized. To raise this amount of steam in a direct-fired boiler, assuming an evaporation of 7 lbs. of water per lb. of coke, it would be necessary to use ⅔ cwt. of coke per day for each ton of coal carbonized, which amount would obviously be saved by using a waste-heat boiler.

Interesting tests, giving highly valuable information, have been carried out on Humphreys & Glasgow waste-heat boilers at the Windsor Street Gas-Works, Birmingham, by the Gas Investigation Committee of the Institution of Gas Engineers. Stewart's paper on heat conservation and water gas (see "JOURNAL" for March 30, 1920) also gives interesting information on the results obtained with this type of boiler The available surplus heat during the blow period of the water gas process is more than the amount required for raising the necessary quantity of steam for gas making and for driving the booster. There is one important point in favour of the fire-tube boiler—*i.e.*, the lower power required for driving the fan. In order to recover the maximum amount of waste heat available, forced draught must be used, regardless of the type of boiler. With boilers of the water-tube type in brick settings, air infiltration through the brickwork, loose joints, and ill-fitting covers, &c., always takes place, and the volume of waste gases is thereby increased. This necessitates a larger power consumption on the fan than is required with fire-tube boilers. As an example of this, with a CO_2 content at the boiler inlet of 14 p.ct. (including water vapour) and 12·3 p.ct. at the boiler outlet, the drop of 1·7 p.ct. is equivalent to an air infiltration of about 11·4 p.ct. of the original volume of waste gases. The power required for overcoming the increased resistance due to this infiltration will be about 38 p.ct. Leaky baffles in water-tube boilers cause short circuiting of gases, due to the difference in draught. Fire-tube boilers, properly designed, will give a higher efficiency per unit of heating surface than water-tube boilers, though the back pressure thrown by the two boilers may be the same.

AMOUNT OF STEAM GENERATED.

After paying considerable attention to heat transmission in boilers, the lecturer went on to say that the amount of steam which can be generated from the waste gases of a carbonizing plant with a given temperature drop can be calculated from the fuel consumption and the CO_2 content of the waste gases. Taking as an example a fuel consumption of 15 lbs. per 100 lbs. of coal carbonized, and a CO_2 content of 13 p.ct. (including water vapour), and assuming that 85 p.ct. by weight of the dry coke has been gasified, the amount of waste gases per ton of coal carbonized will be 65,780 c.ft. per hour at 0° C. and 760 mm. pressure. With a temperature of 1292° Fahr. (700° C.) at the boiler inlet, and 437° Fahr. at the boiler outlet—due allowance being made for radiation losses—the amount of steam generated from and at 212° Fahr. will be 3·7 lbs. per lb. of dry coke supplied to the producer, or about 1240 lbs. from and at 212° Fahr. per ton of coal carbonized.

Fig. 1 gives the maximum amount of steam which can be raised per ton of coal carbonized for a fuel consumption of 15 lbs. of dry coke per 100 lbs. of coal carbonized, for a CO_2 content of 13·0 p.ct., including water vapour, at various tem-

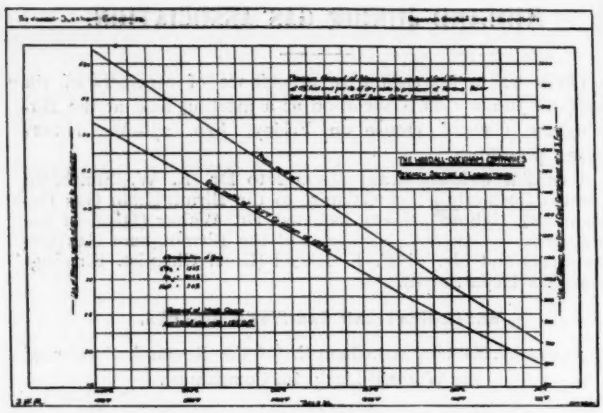


Fig. 1.—Possible evaporation per ton of coal carbonized at the different temperatures of the products entering the boiler.

peratures at the boiler inlet, and for a temperature of 437° Fahr. at the boiler outlet.

Evaporation figures obtained in boiler tests sometimes show a higher heat content in the steam generated than can possibly be obtained from the carbon balance and the existing temperature drop. In nearly every case this result is due to infiltration of gas from leaky retorts into the waste-gas flue. Leakage of waste gases from the chimney side of the by-pass damper back again into the boiler would result in lowering the temperature of the gases at the boiler inlet, and would also increase the volume of waste gases, and therefore would reduce the amount of steam raised. This leakage can be determined by temperature readings at a point before and after the by-pass connection to the chimney; the temperature drop between the two points being equivalent to a definite quantity of diluting gases. Results of tests on waste-heat boilers should therefore be very carefully checked before they are published. Assuming that all measurements, such as the amount of water passing through the meter, temperatures, CO_2 content, and fuel consumption, are within the limits of reasonable error, the heat transmitted and radiation losses should check up fairly well with the heat content of the waste gases for that particular temperature drop. The duration of a waste-heat boiler test should be at least 48 hours, during which period careful readings should be taken of the water evaporated, fuel consumption, analyses of fuel and pan ash, composition and moisture content of waste gases, temperatures of gases, draught conditions, steam pressure, temperature of feed water, &c. These items include all the necessary information which is essential for the carrying-out of successful boiler tests; and the Woodall-Duckham Companies carry out all their boiler tests on these lines. These Companies have installed up to date 56 waste-heat boilers with an approximate evaporation of 1,000,000 tons per annum, representing a saving of fuel and labour of £200,000 per annum, assuming the cost of steam produced by a direct-fired boiler in gas-works practice, using a mixture of breeze and coke as fuel, including labour, at 4s. per ton of steam generated. The saving effected per 1000 c.ft. of gas made at 15,000 c.ft. per ton of coal carbonized on these plants is approximately 3·2d., or about 0·67d. per therm for a gas of 480 B.Th.U.

SAVING BY WASTE HEAT RECOVERY.

Assuming that the annual amount of coal carbonized in gas-works in Great Britain amounts to 15 million tons, the possible saving to be effected by waste-heat recovery would be approximately £3,000,000. The amount of steam which could be raised by the waste heat of the carbonization plants on gas-works in this country would be sufficient to generate almost one-third of the electricity now generated in authorized power stations in Great Britain.

The cost of installation of a waste-heat boiler plant is amortized in a very short time, varying from 6 months to about 2 years, according to the size and nature of plant installed. The following table gives an approximate balance-sheet for two waste-heat recovery plants working in conjunction with plants of different carbonizing capacity.

Coal carbonized in 24 hours	20 tons	..	160 tons
Fuel consumption	16 p.ct.	..	14 p.ct.
,, ,, coke per hour, about	300 lbs.	..	2,100 lbs.
Natural draught or fan	No fan	..	With fan
Steam generated per hour, about	500 lbs.	..	6,000 lbs.
,, ,, per annum	1875 tons	..	22,500 tons
Fuel saved per annum	268 ,,	..	3,214 ,,
Equivalent saving at 30s. per ton of fuel	£400	..	£4,800
Cost of plant, approximately	£800	..	£2,100
Capital amortized in	2 years	..	5 to 6 months

When dealing with small plants carbonizing up to 40 tons per day, assuming the usual temperature conditions of 1300° to 1000° Fahr. in the waste-gas flue, the waste-heat boiler can be designed to work with natural draught. The evaporation per ton of coal carbonized varies on this type of boiler from 400 to 700 lbs. The amount of steam generated per unit of heating surface is, however, much less than for boilers with artificial draught.

FEED-WATER HEATING.

A number of waste-heat boilers installed by the Woodall-Duckham Vertical Retort Company were provided with waste-heat feed-water heaters, or economizers. As, however, nearly all the more recent plants have steam-driven fans, the exhaust steam is utilized in open or closed heaters for pre-heating the feed water. Thus, under suitable conditions, all the latent heat of the exhaust steam can be recovered. Most manufacturers of steam engines and steam turbines will not guarantee a steam consumption below 40 to 45 lbs. per B.H.P. at 100 lbs. pressure for loads up to about 40 H.P. (non-condensing engines). With a fan efficiency of about 50 p.ct., the power required on the fan shaft for evaporations of 3000 to 6000 lbs. per hour varies from 10 to 20 H.P. The utilization of the exhaust steam for pre-heating the feed water represents, therefore, the ideal solution for securing the most economical type of prime mover for driving the fan. In some cases the exhaust steam has been utilized for steaming the producers.

A great number of heat-recovery plants erected by the above firm have been provided with superheaters. These are fitted into the waste-gas flue connection to the boiler, or, in some cases, the superheater is placed in front of the tube plate at the boiler inlet end. The great importance of superheating the steam for general distribution to the various points where it is utilized has not been realized in many works. All the steam generated in direct-fired or in waste-heat boilers should be superheated to some extent, in order to prevent condensation losses. A superheat of about 20° Fahr. above steam temperature would require a very moderate heating surface, although the latter depends on the temperatures of the combustion products. This small amount of superheat would go a long way to prevent condensation.

The lecturer then dealt with water treatment, mentioning that, for a scale coating of about 0·2 in. thickness, the temperature difference between the wet and dry surface of tubes, which for a clean tube could be taken at 50° to 80° Fahr., would increase to 80° to 150° Fahr.

An important factor which influences the efficiency of waste-heat recovery is the CO_2 content of the waste gases. The volume of these gases is in inverse proportion to their CO_2 content, which varies usually from 16 to 10 p.ct. In some cases where the boiler is attached to a carbonizing plant which has been working for some years, the CO_2 content is found to be as low as 8 p.ct., owing to leaky recuperators and leaky waste-gas flues. Though the total heat content of the waste gases entering the boiler will be the same whatever the extent of air infiltration, it will be seen that the increased volume of gases lowers the over-all efficiency of the boiler, and will necessitate more heating surface and fan power.

The heat losses due to infiltration are shown by fig. 2. The ordinate on the left side of the graph represents the CO_2 content of the waste gases, the abscissa represents their volume in c.ft. per lb. of carbon gasified in the producers for CO_2 contents from 18 p.ct. down to 8 p.ct. The ordinate on the right side of the graph represents the temperatures in degrees Fahrenheit corresponding to every CO_2 content, and these represent approximate conditions found in practice. In order to simplify the graph, the specific heat values have been taken to be constant at all temperatures. The total heat of the gases entering the boiler, for a CO_2 content of 18 p.ct., is represented

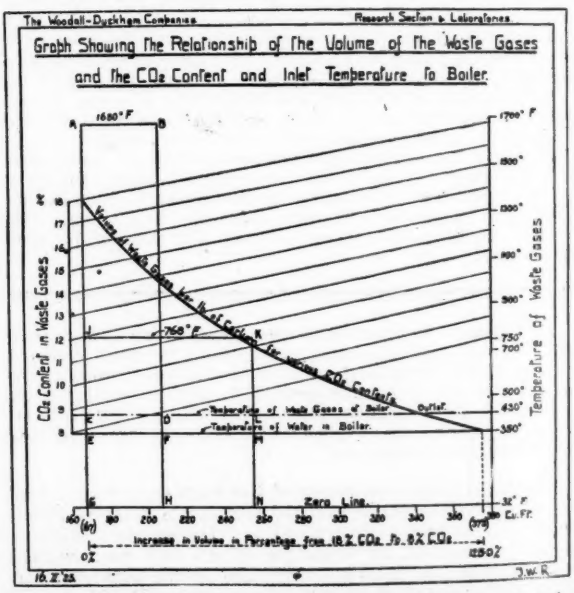

The Woodall-Duckham Companies
Research Section & Laboratories
Graph Showing the Relationship of the Volume of the Waste Gases and the CO2 Content and Inlet Temperature to Boiler
1680° F
760° F
Temperature of Waste Gases at Boiler Outlet
Temperature of Water in Boiler
Zero Line
CO2 Content in Waste Gases
Temperature of Waste Gases
Increase in Volume in Percentage from 18% CO2 to 8% CO2
18% CO2
8% CO2
16.2.25
J.W.R

Fig. 2.—Relationship between the volume of the waste gases and the CO_2 content and inlet temperature.

by the area of ABHG, GH lying on the line representing a temperature of 32° Fahr. The equivalent area for the same heat content, but for a CO_2 content of 8 p.ct., is represented by JKNG, GN also lying on the line representing 32° Fahr. The line EFM indicates the temperature of the steam or of the boiler water, assuming that both the latter are at the same temperature. The temperature of the products leaving the boiler is shown by line CDL. This temperature has been taken to be 430° Fahr. The heat represented by the areas EFHG and EMNG, being below the temperature of the water in the boiler, will not flow into the water, and therefore is not available for absorption.

The heat represented by areas ABFE and JHME is available for absorption. The steam temperature has been taken at 350° Fahr., which is equivalent to 120 lbs. gauge pressure. The heat absorbed by the boiler in the first case is represented by the area ABDC, and in the second case by the area JKLC. The percentage of the heat absorbed of the heat available for absorption represents the true boiler efficiency. In case No. 1 the amount of heat actually absorbed is 1·66 times that of the heat absorbed in case No. 2, and the amount of heat leaving the boiler is for case No. 2 2·25 times as much as for case No. 1. Taken as a percentage of the total heat entering the boiler, the amount of heat leaving the boiler will be about 24·3 p.ct. for case No. 1, and 54 p.ct. for case No. 2—*i.e.*, the total heat efficiency of the plant, not taking into account any radiation losses, will be about 75·7 p.ct. for a CO_2 content of 18 p.ct., and only 46 p.ct. for a CO_2 content of 8 p.ct. The above two examples have been chosen to represent extreme cases; but they clearly illustrate the importance of keeping the CO_2 content as high as possible. Assuming equivalent temperatures of the waste gases at the fan inlet, the power required for case No. 2 would be 2·24 to the third power, or about 11 times that for case No. 1, for producing the necessary draught to overcome the back pressure thrown by the boiler tubes in a boiler of equal cross-sectional area and tube length.

Effect of Waste-Heat Recovery on Efficiency of Carbonization.

In order to illustrate the effect on the over-all efficiency of a carbonizing plant, an approximate heat distribution balance is given below for plants working without, and in conjunction with, waste-heat boilers. The table applies to general conditions of carbonizing plants. In more modern plants, particularly with step-grate producers, the producer efficiently based on hot gas is nearer 90 p.ct. than the 85 p.ct. assumed in the table. An efficiency of 85 p.ct. has been taken to bring the results given more in line with all types of carbonizing plants. The results have been summarized in fig. 3, and the comparison of the over-all heat efficiencies of the two cases should be sufficient to convince every gas engineer of the importance of waste heat recovery from carbonizing plants.

Approximate Heat Balance of a Carbonizing Plant per Ton of Coal Carbonized.

(Fuel consumption, 14 lbs. of dry coke per 100 lbs. of coal carbonized.)

—	Without Waste-Heat Boiler.		With Waste-Heat Boiler.	
	B.Th.U.	P.Ct.	B.Th.U.	P.Ct.
(1) B.Th.U. supplied to producer. $\frac{11{\cdot}8 \times 2240 \times 14{,}580}{100}$	3,855,000	100	3,855,000	100
(2) Loss in producer	578,250	15	578,250	15
(3) Heat brought into setting by hot producer gas	3,276,750	85	3,276,750	85
(4) B.Th.U. for carbonization (assumed)	900,000	23·4	900,000	23·4
(5) B.Th.U. in waste gases and lost in radiation (setting)	2,376,750	61·6	2,376,750	61·6
(6) B.Th.U. in steam from waste-heat boiler (900 × 1150).	..	..	1,020,000	26·4
(7) Heat lost in radiation and stack	2,376,750	61·6	1,356,750	35 2
(8) Heat lost in stack—				
(*a*) at 1230° Fahr.	1,630,000	42·2	..	..
(*b*) at 430° Fahr. (60,000 c.ft. per ton N.T.P.)	..	..	570,000	14·8
(9) Radiation loss (total)	746,750	19·4	786,750	20·4
(10) Radiation loss (boiler plant)	..	..	40,000	1·0
(11) Radiation loss (on setting)	746,750	19·4	746,750	19·4
(12) Over-all heat efficiency of plant	..	23·4	..	49·8

The true boiler efficiency becomes greater as the difference between the temperature of the water in the boiler and the temperature of the products leaving the boiler decreases. The exit temperature may vary from 420° to 520° Fahr. for a boiler working at 120 lbs. gauge pressure; the temperature of the water in the boiler being 350° Fahr. The above temperature difference depends on the degree of cleanness of the tubes, and, of course, also on the design of the boiler itself. Very often the efficiency of a waste-heat recovery plant is judged by the temperature of the escaping products above that of the

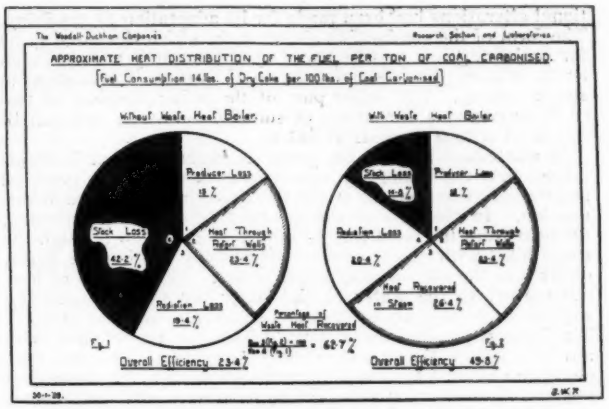

The Woodall-Duckham Companies
Research Section and Laboratories.
APPROXIMATE HEAT DISTRIBUTION OF THE FUEL PER TON OF COAL CARBONISED.
(Fuel Consumption 14 lbs. of Dry Coke per 100 lbs. of Coal Carbonised)
Without Waste Heat Boiler
With Waste Heat Boiler
Producer Loss 15 %
Heat Through Retort Walls 23·4 %
Stack Loss 42·2 %
Radiation Loss 19·4 %
Overall Efficiency 23·4 %
Producer Loss 15 %
Stack Loss 14·8 %
Radiation Loss 20·4 %
Heat Through Retort Walls 23·4 %
Heat Recovered in Steam 26·4 %
Overall Efficiency 49·8 %

Fig. 3.—Heat distribution of the fuel per ton of coal carbonized.

water in the boiler, and a difference of 100° Fahr. between the gas and the water may be considered as normal.

At this stage the lecturer drew attention to the importance of insulation of the waste-gas flues, mentioning that suitable lagging of the settings and flues would decrease the radiation losses from 20 p.ct. to 15 p.ct., or possibly even down to 10 p.ct. Control instruments were also a valuable asset.

Various Designs of W.D. Waste-Heat Boilers.

Except for a small number of water-tube boilers, the waste-heat boilers installed by the Woodall Duckham Companies are of the fire-tube type, and comprise horizontal and vertical, single and double pass boilers. Boilers installed in connection with a large carbonizing plant are always worked under forced draught; but for small plants they operate by natural draught. Practically every boiler is fitted with an automatic feed-water regulator and a high and low water alarm; the boiler plant working, therefore, automatically, and requiring practically no attention.

Results of Tests.

In the following tables some of the more important results are given from tests carried out with waste-heat boilers of various designs erected by the Woodall Duckham Companies in conjunction with their vertical retort settings.

1. Test No.	1.	2.	3.	4.
2. Type of Boiler	Horizontal Single-Pass.	Horizontal Double-Pass.	Vertical Single-Pass.	Vertical Double-Pass.
3. Duration of test in hours	72	168	168	120
4. Coal carbonized per hour in tons	6·19	*	*	5·75
5. Coke to producer per hour in lbs.	2170	410	344	1760
6. Temperature of waste gases at—				
(*a*) Boiler inlet	1213°Fahr.	882°Fahr.	1112°Fahr.	860°Fahr.
(*b*) Fan or chimney inlet	445°Fahr.	415°Fahr.	658°Fahr.	445°Fahr.
7. Steam from and at 212° Fahr. per hour in lbs.	7400	1170	850	4460
8. Steam from and at 212° Fahr. per lb. of dry coke in lbs.	3·41	2·85	2·47	2·53
9. Steam from and at 212° Fahr. per ton of coal carbonized in lbs.	1195	*	*	776
10. Percentage of total available heat absorbed by boiler $\frac{\text{B.Th.U. in steam} \times 100}{\text{B.Th.U. in waste gases at boiler inlet}}$	64·6	55	41·7	49
11. Suction created by	Fan	Fan	Chimney	Fan
12. Percentage of power developed absorbed by draught for setting and boiler plant (assuming 30 lbs. of steam from and at 212° Fahr. per B.H.P.-hour)	7·0	7·7	—	8·5

* In tests 2 and 3, the number of retorts working was only about 60 p.ct. of the total number of retorts heated. The amount of steam generated per ton of coal carbonized would therefore be out of proportion, as compared with normal working conditions. Even with gas temperatures as low as in the case of test No. 4 (860° Fahr.) waste-heat boilers will be found a commercial proposition—in fact, it may be said that heat recovery on the lines described in this paper does not cease to be economical until the temperature at the boiler inlet reaches about 700° Fahr.

Gas-Fired Boilers.

British Furnaces, Ltd., of Chesterfield, one of the Companies allied to the Woodall Duckham Companies, have lately placed on the market a gas-fired boiler specially designed to incorporate the principles of surface combustion. The "Cochran" boiler built by Messrs. Cochran, Ltd., of Annan, was found to be an ideal design for the purpose, after the necessary construc-

tional alterations had been made for its adaptation to gas firing. The form of the combustion chamber, in which the usual grate for coal firing has been replaced by a refractory bed, is excellently adapted for the application of surface combustion to steam raising. The upper part of the boiler consists of two or three passes of fire-tubes of suitable diameter, and can be compared with a waste-heat boiler.

In waste-heat boilers, the greatest amount of heat is transmitted into the water by convection, whereas in gas-fired boilers radiation may be made the main factor in heat transmission. In the case of the gas-fired boiler to be described, the heat from the refractory bed flows by radiation through the space filled with gases, without appreciably heating the gases, direct into the surrounding boiler plates. The amount of heat transmitted to the water of the boiler per unit of radiating surface depends entirely on the temperature of that surface. The highest possible temperature which can be obtained with any gas is the theoretical flame temperature—*i.e.*, the temperature obtained by complete combustion with the theoretical amount of combustion air. The application of surface combustion is the ideal method of ensuring perfect combustion and maximum temperatures with practically the theoretical quantity of combustion air. The amount of heat received by the boiler by radiation, assuming constant temperature conditions, depends on the area of the hot radiating bed, and not on the exposed area of the boiler heating surface. The hemispherical shape of the refractory bed and of the combustion chamber represent, therefore, the most efficient design of surface combustion for steam raising (see fig. 4). Tests carried

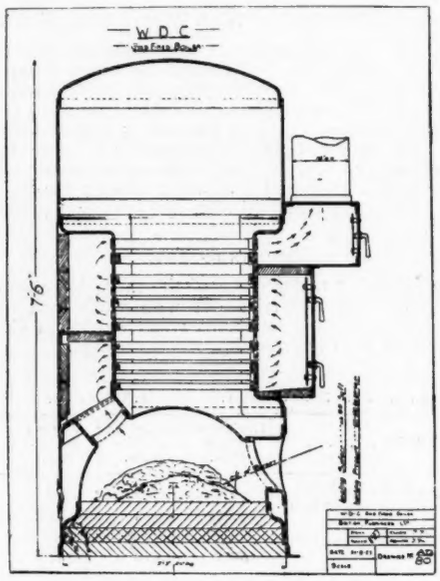


Fig. 4.—Section of gas-fired boiler.

out on the Woodall-Duckham-Cochran boiler show that an evaporation of 30 lbs. and over is obtained per sq. ft. of heating surface in the combustion chamber. It is therefore obvious that the higher the amount of heat transmitted into the water by radiation, the smaller will be the total heating surface required for the total evaporation of the boiler. It is, therefore, advantageous to transmit the greatest part of the heat directly by radiation.

A particular boiler 4 ft. 6 in. in diameter by 10 ft. high, designed for a working pressure of 100 lbs. per sq. in., is capable of evaporating 1200 to 1300 lbs. of water per hour. The base of the combustion chamber consists of a refractory bed. The surface combustion burner is fitted into the boiler through the original fire-hole door. The construction of the burner automatically maintains constant proportions of gas and air in the mixture at all loads. The combustion air is supplied under a pressure of about 10 to 15 in. water gauge. The air passes at a high velocity through a scientifically-designed throat, and entrains the correct proportion of gas, which is supplied from the main at a constant pressure through a governor. The burner design is such that it is possible to control with a single valve the quantity of mixture fed to the combustion chamber. The amount of power taken by the air blower is about 1 p.ct. of the power developed by the boiler, assuming 15 lbs. of steam from and at 212° Fahr. per B.H.P. The combustion gases pass from the combustion chamber through two or three passes of fire-tubes into the stack. An automatic regulator worked by the boiler steam pressure regulates the control valve of the burner. The boiler requires, therefore, no attendance whatever. The ground space occupied by this type of boiler is extremely small as compared with that required by a coal-fired boiler plant.

A comparison of the operating costs shows that with the prices obtaining for gas to-day, gas-fired boilers cannot compete with those fired with coal. However, for many industrial concerns, such as printing works, &c., which are often situated in congested areas, where ground space is of value, the increased cost of steam raising is a small item in view of the many advantages obtained by gaseous firing. With gas-fired boilers steam can be raised in less than an hour, and peak-loads can be met automatically in a few minutes. With a burner of the type described above, the boiler efficiency is constant at all loads. Among the numerous advantages of this type of gas-fired boiler, the following may be enumerated:

Guaranteed high efficiency (up to 90 p.ct.), perfect and flameless combustion, automatic proportioning of gas and air, backfiring and explosions eliminated, no excess air in products of combustion, no brickwork setting required, dry steam, minimum floor space, no induced draught, radiant heating, no attendance required, no condensation troubles, saving in labour, no coal to be carted to site, no ashes to be taken away, and no smoke, dust, or dirt. The boiler is of substantial construction.

Two tests carried out on boilers of different capacities gave the following results:

Number of test	1.	2.
Date of test	July 21, 1924.	Oct. 25, 1924.
Heating surface, about	150 sq. ft.	50 sq. ft.
Gas used at 60° Fahr. and 30 in. Hg per hour	3378·32 c.ft.	1078·62 c.ft.
Calorific value of gas (net)	419 B.Th.U.	446·5 B.Th.U.
Amount of water evaporated per hour	1062 lbs.	366 lbs.
Temperature of feed	60° Fahr.	55° Fahr.
Steam pressure per sq. in.	103 lbs.	69·33 lbs.
Barometric pressure, lbs. per sq. in.	14·56 ,,	14·85 ,,
Absolute pressure, lbs. per sq. in.	117 56 ,,	84·18 ,,
Heat utilized per hour	1,232,345 B.Th.U.	425,450 B.Th.U.
Heat available ,,	1,415,516 ,,	481,604 ,,
Net efficiency of boiler	87·07 p.ct.	88·34 p.ct.
Temperature of products leaving boiler	403° Fahr.	398 3° Fahr.
CO_2 content of products	11·3 p.ct.	—
Amount of water evaporated from and at 212° Fahr. per sq. ft. of heating surface	8·46 lbs.	8·75 lbs.

The more general utilization of town gas for steam raising in gas-fired boilers should make it possible for gas-works to lower the price of gas for industrial consumption. Not only would this result in a reduction in the number of direct coal-fired boilers, most of which have extremely low efficiencies, but it would also effect a great saving of the valuable bye-products which to-day are lost to the Nation.

I desire to thank the Directors of the Woodall-Duckham Companies for permission to present this paper, and to acknowledge the assistance I have received from Dr. E. W. Smith, to whose suggestion the application of the surface combustion principle to the gas-fired boiler is due.

Discussion.

The PRESIDENT described the contribution as one of the master papers of the session. He thought the author had conclusively shown that, if gas were supplied at a reasonable figure, steam generation by waste heat was a sound commercial proposition.

Mr. J. H. GEE (Nechells) proposed a vote of thanks to Mr. Reber.

Mr. I. H. THOMAS (Birmingham) seconded the resolution. In alluding to points in the paper, he referred to tests on four different types of waste-heat boilers, and inquired how the B.Th.U. in the waste gases at the boiler inlet were calculated.

Dr. E. W. SMITH congratulated Mr. Reber on the able way in which he had dealt with his subject. The paper represented to some extent a slight change in policy, in that it was very rare that contractors were prepared to go to such lengths to make available information which was the result of a large amount of time and expenditure on research work. Their interests, however, were bound up with those of the gas industry; and it was only by pooling information that the industry could succeed. There were one or two things he would like to accentuate. When using waste-heat boilers, it might not be realized that it actually paid, if more steam were wanted, to connect up the producer to the settings of the boilers. When all charges were taken into account, it would pay to burn extra gas, and use it under the waste-heat boilers in cases where more steam was wanted. Dr. Smith, speaking on the necessity for water treatment, said it paid handsomely to prepare water for use in boilers. The savings effected were more than equal to the cost of water softening.

Dr. WALTER said that the waste-heat boiler was, after all, a form of recuperator. The conservation of fuel was one of vital importance. It had been dealt with at some length at the first World Power Conference, but he was surprised that the question of the utilization of waste heat did not get that attention which he expected it would receive. There was no doubt that the waste-heat boiler was an economical plant. He was specially interested in what Mr. Reber had said with regard to the importance of lagging. He wondered if the author had tried the effect of lining his fire-tubes with refractory material. The question of gas-fired boilers was especially interesting to those who had to deal with the industrial application of gas; and though they could not hope to compete with solid fuel with regard to steam raising in bulk, he felt that, if manufacturers would carefully diagnose their costs, they would find in many cases that a gas-fired boiler was more economical than the present small vertical boiler such as was used in laundries, &c.

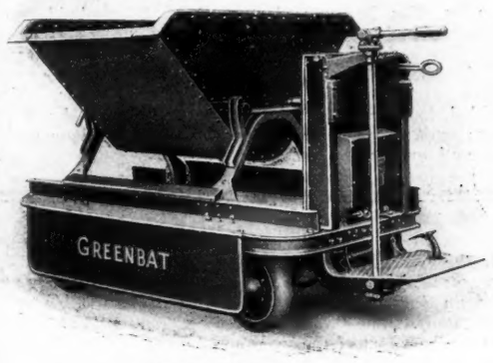
Mr. H. R. HEMS (Secretary of the Association) thought there was

a big field for the gas-heated boiler. Substantial progress would be made when gas was cheaper.

Mr. Reber, replying, said that the troubles from flue dust were readily overcome in fire-tube boilers while the boilers were at work. Owing to the high evaporation, and the comparatively low temperatures, the difficulties arising from the use of hard water were not nearly so great in fire-tube boilers as was supposed. In any case, the advantages of the fire-tube boiler were such that it would pay to shut-down the boiler twice a year, in order to clean the water side of the tubes. It paid to treat water used for steam raising, except in exceptional circumstances. Mr. Thomas had remarked that he had found that at Nechells a higher evaporation was obtained during periods of air infiltration. It was conceivable that this was the case in such instances where, owing to special conditions, the velocity of gas in the tubes had been reduced below the critical velocity. In that case the advantage of the addition of air in maintaining the necessary velocity was greater than the disadvantage due to dilution of temperature through infiltration. All the calculations and efficiencies given in the paper were based on the sensible heat of the waste gases, including the water vapour, from and above 32° Fahr. As regards the low figure of 15 lbs. per B.H.P. for driving the fan used in connection with the gas-fired boiler, it was assumed that the fan would be electrically driven, and that the current would be obtained from an efficient power station. It might be stated that in the type of gas-fired boiler described in the paper, there was ample steam space, and no instance of priming had been noted. Fire-tubes lined with refractories showed no advantage over unlined straight fire-tubes, owing to the large increased back pressure thrown by the refractories. Mr. Reber submitted that boiler efficiencies should not be made to include the work done by a feed water heater, as these might be put on all types of boilers. Mr. C. F. W. Rendle had raised the point of mechanical advantages and capital outlay of the water-tube and fire-tube boilers. The capital outlay depended chiefly on the conditions of site, &c., and it was not possible to give any correct figure which would apply to all cases. Generally speaking, it might be taken that with fire-tube boilers a higher heat transmission was obtained than with water-tube boilers, assuming an equal thickness of scale on the tubes. This was due to the higher velocity of the waste gases in the former. When using softened water, a boiler should run efficiently up to the time for its official inspection, when the tubes were cleaned. The installation of an exhaust steam feed water heater, either of the closed or open type, seemed to be the best method of recovering all the latent heat from the exhaust of the steam engine driving the fan, and made the waste-heat recovery plant, in conjunction with the carbonizing bench, a complete and independent unit.

ELECTRIC TRUCKS.

After a long period of prejudice, the electric battery-driven truck is at last coming into its own, and is being adopted in increasing numbers each year by manufacturers at home and abroad. The uses and advantages of an electric truck are apparent to everyone; and an every-day illustration of their utility may be witnessed at any of the great railway termini in the Kingdom. Such trucks have been applied most successfully to other operations where their activities do not have the same open advertisement as do those working in the public places mentioned. The types in general use in this country and America are:



Side-Tipping Truck.

1.—The standard high platform truck with a carrying capacity of 2 to 4 tons. This truck has its platform approximately 20 in. from floor-level, and it may be fitted with any kind of superstructure called for by the goods it is desired to carry, or the platform may be left open.

2.—The low platform truck with a carrying capacity of 2 to 4 tons. The platform is 11 in. from floor-level—a convenient height for handling heavy case goods, &c. The battery is mounted on the platform of the truck.

3.—The elevating platform truck. This is built on similar lines to the low platform truck, and the platform is elevated by means of a motor operated from the driver's stand. The truck is run underneath a stillage on which the merchandise is piled, picks up the complete load, and deposits it in any desired position. The advantages of this method are so apparent as to need no explanation. One truck can deal with any number of stillages, and it may be used, if desired, as a low platform truck.

4.—In order to meet a demand for a smaller truck, and one capable of being taken to different floor levels of a building by means of a lift, there is a lighter model of electric truck, with a carrying capacity of 10 cwt. This will work in narrow passages or congested areas. The driver's platform folds up flat against the truck, to economize space in the lift.

5.—For these models the makers—Messrs. W. Goodyear & Sons, Ltd., of Dudley—have designed ingenious equipment to make them suitable for many different trades and varieties of work. A side-tipping or end-tipping body may be fitted to the standard truck for handling coal, coke, sand, silica, &c. These have been adopted by a number of firms (see illustrations). A most successful truck is in operation at the Liverpool Docks at Messrs. Elder Dempsters. This composite truck is capable of towing a trailer with a gross load of 2 tons, will carry a platform load of 2 tons, and at the same time will automatically lift a palm oil cask weighing 1 ton, and deposit it in any desired position—the whole of this latter operation being accomplished by the driver without leaving the driving seat. With regard to the trailer, this is supplied by the truck makers, if required. A standard truck will, in addition to its own load of 2 tons, tow a trailer on the level to a gross load of 2 tons. The electric truck itself will, fully loaded, take a gradient of one in seven.

The battery is now as efficient and reliable as the machine itself, and the purchaser of an electric vehicle has a wide range of batteries for his selection. The battery is of two types, the lead or alkaline. Each has its advantages and sponsors; but both, if supplied by a reliable firm, are dependable, and, moreover, there is a generous guarantee given by the makers. Where electric trucks can be used to displace hand or horse labour, they are a very fine investment indeed, and can be depended upon to return a handsome dividend if full use is made of their capabilities.

End-Tipping Truck.

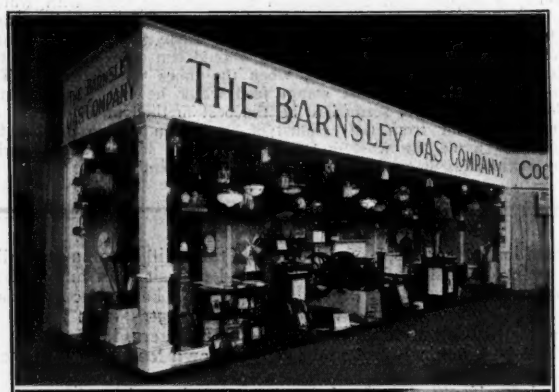
The Ullrich Magnetic Separator.

Until quite recently the producer and boiler furnace clinker at the Berne Gas-Works were hand picked and mechanically screened; but it is stated in the monthly "Bulletin" of the Association of Swiss Gas Engineers that an electro-magnetic coke separation plant has now been installed, to deal with 2 tons of clinker per hour. The plant is on the Ullrich system, and comprises a spout for the raw material, an iron belt which conveys it to a bunker with a jigging screen attached, and the magnetic separator itself. The last named consists of a double screen with four outlets, a picking belt, and the separating drum with the electro-magnet built in. A 15 H.P. motor drives the plant itself, and the dynamo for the production of the direct current for the separating drum. The clinker is tipped from trolleys straight into the spout, and the belt conveyor takes it to the bunker. Here it is separated by the jigging screen into small on one side and large on the other—the latter being hand picked by the one man who has charge of the entire plant. Sizes between the large and the small—that is, between 10 and 40 mm.—are divided on the double screen into above and below 20 mm., and run through the four outlets direct on the steel bands of the magnetic drum, which attracts to its sides the clinker, while the non-magnetic coke is precipitated forward. The coke and the clinker, thus separated, fall into their respective hoppers, and are removed as required by truck.

GAS EXHIBITION AT BARNSLEY.

An interesting and highly successful exhibition of gas appliances was held by the Barnsley Gas Company in the Drill Hall, Barnsley, during the week ended Feb. 14.

The opening ceremony was performed by Mr. E. G. Lancaster (Chairman of the Barnsley Gas Company), who said it was twelve years since a gas exhibition had been held in the town, and during that time the strides which had been made in the use of gas for cooking and heating had been enormous. In his opinion, in ten or twenty years an open coal fire would be entirely out of date, and its place would be taken by a gas or electric fire. A gas fire was welcome for various reasons. First, it was very convenient. There was no coal to lay, and no ashes to remove. It was also much cleaner, as it produced no smoke. It was cheap, and made possible a great saving of labour. His personal experience of gas fires was very satisfactory. If it was desired to use a room for half-an-hour, no one would light a coal fire; but a gas fire could be put into operation in a moment. A gas fire appealed to the small householder as much as it did to the large owner.



The stands were occupied by the Davis Gas Stove Company, of London and Luton, General Gas Appliances, Ltd., of Guide Bridge, Manchester, and Wilsons & Mathiesons, Ltd., Carlton Works, Leeds. The Barnsley Gas Company also had a stand.

The Davis Gas Stove Company showed the "New World" cooker, and a range of their "Alpine" and "Pennine" series of cookers and elevated ranges, in addition to fires and radiators, which included the safety garage heater. General Gas Appliances had on view their new "Warmu" fire, which received considerable attention from visitors. Their selection of cookers included the "Dainty" and "Britannia" models, together with examples of the raised type. Their steam radiators also aroused interest. Messrs. Wilsons & Mathiesons, in addition to "New World," "Royal" and "Premier" cookers, had a wide range of their "Sunbeam" fires. Great interest was shown in their hot water circulator and "Lyn" boiler fitted in a model bathroom.

The Barnsley Gas Company's stand constituted a general exhibit of appliances. A large display of ornamental lighting appliances received considerable attention. The chief feature was a model bathroom fitted with the "Hostler" water heater, the Davis "63 A" geyser, and the "Midget" geyser. A heated towel-rail completed the exhibit. A "National" gas engine, table fan, greenhouse heater, and a selection of industrial burners manufactured by the Davis Gas Stove Company were also shown. Separate tables were arranged showing the various stages in the manufacture of Welsbach gas mantles, and also demonstrating the heat-resisting qualities of vitreosil glassware. Well-attended cookery lectures were given by Miss Bonham Carter, B.Sc. (Household and Social Science), which assisted greatly in the success of the exhibition. The body of the hall was well lighted by Messrs. Staniforths' 10-light "Wembley" lamps, and the lecture room with Messrs. Hutchinson's 4-light "Zenith" lamps. Tea was provided for the visitors, made in their sight by a Jackson boiler; and an excellent orchestra gave selections each afternoon and evening.

Concrete Quality.

All the portland cement that comes on the market in that country to-day is made to meet the rigid requirements of the American Society of Testing Materials and the United States Government. The "Gas Age-Record" points out that studies made on the effect of the size and grading of the aggregates has given rise to the term "fineness modulus"—a function of the sieve analysis which has been found to have a direct relation to the strength of the concrete. The aggregate is analyzed with a selected set of standard square mesh sieves, each one of which has a clear opening double the width of the next smaller. When the screen analysis has been made, the percentages of the total aggregates coarser than each size of sieve are added together, the sum of these percentages is divided by 100, and the result is the "fineness modulus." It has been found that a direct relation exists between the compressive strength of the concrete and the "fineness modulus" of the aggregate. In general, the higher the "fineness modulus" (the coarser the aggregate) the higher is the strength of the resultant concrete. This remains true so long as the proportion of cement and water is such as to produce a plastic or workable mixture of concrete. Impurities in aggregates are objectionable, because they reduce the strength and increase the porosity of the concrete. Aggregates should not contain more than 7 p.ct. by volume of silt, clay, loam, or other harmful matter. Organic matter is sometimes found in sand in sufficient quantity to reduce seriously the strength of the concrete in which it is used. It is always advisable to use screened and washed sand and gravel procured from a reliable source. Based on thousands of tests, it has been established that there is a direct connection between the ratio of mixing water to cement used and the strength of the concrete. The least amount of water should be employed that will give a workable mix. The time taken in mixing is a matter of importance; the process should not be hurried.

Mr. Joseph Cecil Clay, of Donnerville, Wellington, a Director of the Shrewsbury Gas Light Company and of the Wellington Gas Company, who died on Sept. 20, 1924, left estate of the gross value of £43,351, with net personalty £36,542.

DISTRIBUTION OF GAS, AND THE EXHAUSTER.

By NORTON H. HUMPHRYS.

"Distribution" is the term commonly applied to the conveyance of commodities to the place where they are used or turned to practical account. The form or nature of the commodity is immaterial; it may be a solid, a liquid, a gas, or an intangible force or energy. Town gas, as supplied from one or more centres, is no use to the consumer until it has been delivered to the apartment, workshop, or other place where it is to be consumed. Some kinds of gas, used only in small quantities, can be compressed into strong iron vessels, and delivered as solids, but we are concerned only with mains and services, supplied from a gasholder. Gas can be conveyed from the storage receptacle to the burner by pull, by push, or the two combined, but in practice may be regarded as being pushed. There are, or have been, exceptions. Readers of the advertisement columns of the "JOURNAL" were accustomed for some years to see an illustration of a wet type meter, having the axle extended outside the casing proper, in order to accommodate a winding reel, to which power could be applied by a cord and falling weights that were lifted or wound-up by hand at appropriate intervals, similar to the procedure with weights pertaining to a large clock. The pull of the weights would turn the axle, and the meter drum would act as an exhauster, drawing on the inlet, and increasing the pressure on the outlet. It was an application of an old idea that the wet type meter could be made to "move" the gas, by the application of mechanical energy, in addition to measuring it. For obvious reasons, this arrangement is not suitable to modern distributing conditions, and is now rarely used.

PUSH AND PULL.

Talk to the average gas engineer about push and pull, and he may be rather doubtful as to the exact meaning; substitute exhausting and boosting, neither of them expressive or elegant terms, and he will readily follow. To take a common illustration, a row of railway cars, connected together, may be moved by one or more of three methods. The motor may be attached to the front, to the rear, or introduced at any intermediate point between two cars. It pulls from the front, pushes from the rear, and in the third case it combines both methods of movement. The gas exhauster occupies a similar position. It pulls inward at the inlet, and pushes outward from the outlet.

Strange to say, the second—and certainly equally important function—is seldom noticed. Much is heard at times about the pull, but little about the push. A visitor inspecting a gas-works would probably be told that the work of the exhauster was to pull the gas away from the retorts as fast as it was liberated; and that the weight of the holders supplied the force required to distribute gas to all parts of the district. Here is an example of a position that may be met with in other circumstances. Prominent and imposing heads of departments have been known to be not above pocketing the credit due to operations that have been entirely under the control of obscure subordinates. The assistance of the holder, both as an accumulator and a pressure equalizer, is indispensable; but in no sense is it a motor or source of power. Unless kept clear of the bottom resting stones by an adequate incoming supply of gas at a somewhat higher pressure than the holder can throw, there is a speedy lapse to a dead and useless condition. Yet no one thinks of taking off his hat to the exhauster, as the little chap who actually does the work.

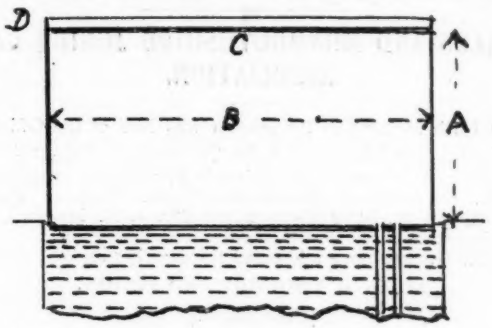
Some experienced gas engineers who have been in touch with exhausters for perhaps fifty years are accustomed to talk about boosting as a new thing, quite different from the established system. Terms such as "natural" and "artificial" are sometimes applied. But the fact is that, from the first, the exhauster has pushed in addition to pulling. Until recent times, with the exception of a few Brobdingnagian undertakings, the engine driving the exhauster did everything, including pumping of tar and liquor. The general practice to-day is an independent drive for the exhauster, and direct action pumps. I was amused, a few weeks ago, to hear a gas-works manager of some twenty-five years' standing questioned as to his experience in "boosting."

PRESSURES.

Also there is some tendency to size up gas distribution pressures as something near to those required for water or steam. The reason that led to the adoption of the inch water gauge is the same as that for being dissatisfied with expressing short distances in mileage terms, and therefore substituting inches for feet. One inch water gauge is equivalent to 0·036 lb. per sq. in., or, to put it another way, 1 lb. per sq. in. is the same as rather less than 28 in. of water, or 280 tenths. The inconvenience which led to the adoption of a special standard is evident; and the point is important as throwing some light on the work of distribution, also as a means of correcting wrong impressions. Engineers have been known to fight shy of 20 in. as being something near a bursting pressure, yet would think nothing of putting water or steam through a similar system, at 50 lbs. or more per sq. in., and with no special precautions in the way of heavier sections or stronger joints. They have had long experience with a similar pressure at the exhauster outlet, and never suffered any ill-effects. No doubt the item of "unaccounted for" is in view. But if the condition of the distributing system is such that it cannot be charged with a pressure of 1 lb. per sq. in., there is room for some overhauling.

If we enter the exhauster room at an average gas-works of 100 million c.ft. per annum capacity, or a maximum 24-hour make of 500,000 c.ft., a small machine will be found in use, actuated by a 4 or 6 H.P. (nominal) engine at a speed sufficient to maintain a steady pull of about 2 in. on the inlet, to compensate for the hydraulic seal and the pressure lost by the hot gas in passing through the foul main and condensers, against an outlet resistance of about 16 in. The total resistance is 16+2=18 in. The energy thus represented can be expressed in foot-pounds or horsepower-hours, with the aid of a simple calculation.

The sketch herewith shows a sectional elevation of a gas-



holder and upper part of the containing tank. As it is required to deliver 500,000 c.ft., the diameter B may be about 113 ft. and the working height A, from the inside of the crown to a point slightly above that at which "blowing" would commence, about 50 ft. It is assumed to have a flat crown C, to be exactly counterbalanced, and to travel friction-free. The sides D extend above C and form a shallow tank of the full diameter B. The holder, being empty and grounded, is loaded to give a pressure of 18 in. water gauge, by adding water on the top of the crown to a similar depth. As the horizontal area is about 10,000 sq. ft., the quantity of water used will be 15,000 c.ft., equivalent to 93,750 gallons, or 937,500 lbs. If the exhauster is now set to work, and caused to pass the full complement of 500,000 c.ft., the holder (counterbalanced) and its water load will be lifted 50 ft., and the energy so expended is 50×937,500=46,875,000 ft. lbs. One H.P.-hour is equal to 33,000×60=1,980,000 ft. lbs., so this quantity represents about 24 H.P. If 24 hours can be allowed for the work, about 1 H.P. will be expended on the gas. The mechanical duty of the engine and exhauster is low, because the actual requirement is small as compared with the natural inertia and friction of solid moving parts.

The results are not influenced to any extent by the holder dimensions, so long as the diameter B, multiplied by the working height A, amounts to 500,000 c.ft. The one will vary in inverse proportion to the other. If the horizontal area is only 5000 sq. ft. (one-half) the rise must be 100 ft. (double). As we are dealing with pressures above atmosphere, not with absolute quantities starting from zero, considerations of work done against atmospheric pressure are out of sight.

DISPOSAL OF OUTLET PRESSURE.

The nature of the work done by the inlet pull has been explained, and we have now to consider the disposal of the 16-in. outlet pressure. About 10 in., nearly two-thirds, is absorbed before the gas reaches the holders, by forcing the gas through water seals in washers, the resistance of the so-called "dry" purifying material, the station meter, and a circuitous course of connecting pipes. But the method of disposal does not affect the position. A pressure of 6 in. is the same, whether lost in passing purification obstruction, or lifting a holder. Of the one-third that reaches the holder, the requirement for working the consumers' meters, and delivering at a fair working pressure, will account for about one half, and the remainder is sufficient for the work of actually moving the gas from the holders to the numerous points of combustion. Starting off through a trunk main of about 12 in. diameter, it traverses some 15 to 20 miles of branches ranging from 8 in. to 3 in., next is divided among some 3000 service supplies and a similar number of meters, from which it passes through smaller pipes, a large part not more than $\frac{3}{8}$ in. diameter, to the burners. The aggregate length of services would be not less than 20 miles, and the interior piping double or three times that quantity. The average travel of the gas, from holder to burner, would be nearly 10 miles; and yet the energy absorbed in actually distributing 500,000 c.ft. of gas is only 4 H.P.-hours.

Complaints sometimes made of the heavy burden represented by storage and distribution of gas are based on the customary practice of including under that head all incidental charges such as cost of meter maintenance, remuneration of outside staff, showrooms, unaccounted-for gas in c.ft. or in therms, &c. These go towards swelling very modest direct charges to

the extent of perhaps one-third of the total revenue expenditure. On the basis of current prices, the annual outlay on exhausters (usually provided in duplicate), holders, governers, mains and services, as represented by interest on outlay, reasonable depreciation allowance, and operating expenses, in the 100 million works, would be somewhere round £2500, equivalent to 6d. per 1000 c.ft., which compares favourably with the cost of delivering solid or liquid commodities over an area of similar extent.

The possibility of moving large quantities of gas over long distances by a very moderate expenditure of motive power is due to its small weight (the 500,000 c.ft. above mentioned would tip the scales at about seven tons) together with a high degree of mobility, which reduces surface friction on the interior of the distributing tubes to a trifling item. All these matters are important in connection with the extensive adoption of boosting and high-pressure distribution.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

The Fifth Meeting of the session was held at the Offices of the Cardiff Gas Light and Coke Company on Feb. 21. Mr. B. J. Bell, President, was in the chair, and was supported by Mr. R. G. Shadbolt (Birmingham), Mr. Octavius Thomas (Pentre), Mr. D. Muir (Pontypridd), Mr. J. E. Mogford, and Mr. Simpson.

Mr. R. G. Shadbolt addressed the meeting on

LINES OF THOUGHT AND ACTION.

[Condensed.]

I heartily appreciate your invitation to address you. I have always been extremely interested in the Junior Associations, and have watched their progress with the closest attention. No one will disagree with me when I say that the Junior Gas Associations have achieved for themselves a position and carved out for themselves a place such as their pioneers could never have dreamed of. A quarter of a century ago a few zealous young men in the Manchester area asked to be received by the Committee of the District Institution of Gas Engineers, of which I was a member. They appeared before us; and it is almost amusing when one realizes the modesty of their request, which was that the seniors should encourage the juniors to equip and qualify themselves for the positions occupied by the seniors when those positions became vacant. Their first plea was that of education. Many objections were raised by the seniors at that time. These, however, were not put forward in a hypercritical spirit, but with a desire to see if anything could really be done for these ambitious young men. So far as I am aware, this was the beginning of Junior Gas Associations. From that time forward these modest intentions materialized and developed by dint of perseverance and by taking advantage of every opportunity that presented itself to foster new ideas. At the same time it was realized that a certain amount of flexibility was advisable, if they were to make headway and benefit the industry.

While the movement did not spread like wild-fire, its growth and expansion has been sure. The work you can do, particularly from the technical point of view, is of immeasurable advantage to the industry. My sympathies were with the Junior Associations from the very beginning, are with them to-day, and will continue with them to the end.

In studying the progress of the Junior Associations one is struck by the fact that when juniors become seniors they are loath to sever, and many will not sever, their membership of the Junior Association. While many of them have almost achieved fame, they still maintain their connection and still work in their junior organization. This is a fine thing, and a source of strength and inspiration to the juniors. As a result, the Junior Associations are becoming more stabilized, more crystallized, and constantly growing in stature as they grow in years.

You are just as much a complete organization of the gas industry as is the Institution of Gas Engineers itself. You have carved out for yourselves a place. See to it that you discharge your duties, not only content to share in the privileges, but each taking upon his shoulders his full quota of responsibility. It was said by Herring some time ago: "The problems of the future lie with you and your fellows." He was perfectly correct. The problems of the gas industry rest with you and your fellows throughout the country. You will find that it will require all the mental training and discipline possible for you to cope successfully with these problems, because they are at once most attractive, most interesting, and most intricate.

The Mental Aspect.

In our industry we require combination, co-operation, and co-ordination in the various parts of public utility supply; these being first essentials, from initial conception to final discharge of service. Respective parts are so interdependent that, unless united in aim and objects, strain and friction are bound to ensue, to the detriment of service and all concerned.

Our particular industry is carried on under such a variety of conditions—geographical, economical, competitive (national or local)—that at first sight it might appear futile to attempt to generalize; but this is not so, as from the smallest to the greatest of our undertakings the underlying principles are the same—viz., to serve the public in the best possible way, not merely by supplying a sufficiency of our main product to meet their demands, but by using every effort to produce at the lowest possible cost, supply in the most acceptable manner, and extend utility in all possible directions, increase manifold applications by intelligent study and understanding of possibilities of further utilities in trade and commerce, in the workshop, warehouse, office, and home, and never to write *finis* under any of its applications, be they ever so perfect. Keep the community served and instructed in the advances and progress made by the industry from time to time, so that they may appreciate the efforts put forth and more readily adopt services designed for their use and enjoyment. To achieve this object, whatever the magnitude of the undertaking, calls for the exercise of the same ability—administrative, executive, managerial, engineering, chemical, and accounting, with a strong technical strain permeating the whole. In many cases the restricted field of action of small undertakings, and the variegated abilities looked for, can be combined successfully in one or two persons; while the staffs of larger undertakings naturally comprise departmental and sectional heads, and these are subdivided according to the magnitude of their operations and the system of organization adopted.

There is but little likelihood of loss of power and efficiency through friction where one man only is concerned with the responsible direction of affairs, or with two or three where one is concerned with administration work only; but the moment more are involved, there arises the possibility of friction, misunderstanding, and working at cross purposes, with consequent loss of efficiency. A great impulse of all parts of our industrial machine necessarily follows if one main line of thought dominates the whole, with all other lines acting as tributaries making the general movement certain and irresistible. What is the nature of the main thought line? Service, of the highest and best. To preach doctrine of service to the gas industry or any section of it may be deemed supererogation, but may possibly be permitted when addressing juniors. Mr. G. W. Sterling Taylor writing recently in "Public Mind," said there were few things which were not worthy of due consideration. "It is all a matter of proportion! The art of life is in striking a balance giving everything its true value." The question of true-hearted service is surely worthy of all consideration. To equip for the highest form of service, considerable preparation and application are necessary, which brings us to the question of education, both as preliminary and secondary conditions. To link up successfully general and specialized education has been the object of our technical organizers for some time; the greatest progress being exemplified in the Institution of Gas Engineers' Education Scheme now in operation, which to my mind marks a distinct step in the right direction. It is not my intention to dwell upon this; it is well known to you. Suffice to say that it is flexible and subject to revision as occasion requires, and that for commercial matters still awaits crystallization and approval.

Concentration.

The chief requisite at this stage is concentration of mind. During everyday practical touch with application of special studies undertaken, your powers of observation become enlarged, the linking of ideas becomes habitual, and the gradual trend of thought almost unconsciously concentrates upon main objects and is in the desired direction.

The student must never lose sight of the fact that he is only one unit in the scheme of things. Be he proficient as he may, to put his knowledge and power to the best possible use he must act in conjunction with others. Unity of thought is the first essential, if the main object is to be achieved. He must have more than a nodding acquaintance with others. There must be co-operation, and a sympathetic acquaintance with their particular spheres and special associations. No man can be sufficient unto himself in our industry; and the more sympathetic his understanding of the work of his colleagues, the better will he be able to discharge his own duties.

Mere thought cannot accomplish much. However rightly trained and disciplined a thinker may be, unless his ideas are translated into definite action, he is not of much avail. To be a dreamer with visionary ideals is useless without a practical strain which will consolidate and translate to some tangible results. Hence the demand for those who in their business activities can be termed practically minded. On the other hand, there is the danger of seizing upon isolated facts and generalizing into ideas concerned with practice without due consideration of results. I need not in this connection mention any special case, as you are aware how often a wrong conception, selected as a basis for action, has brought disastrous results practically. Such occurrences are generally a deterrent to progress. It is necessary in life to give all these things your careful consideration, so that they may be co-ordinated with the main stream of thought and action. As for those who aspire to administrative duties, as well as those at present holding such office, I would remind them that it should be part of their policy to avoid undue interference with executive depart-

ments. There is nothing more disastrous, both to the individual and to the industry, than friction. Huxley, when he was being shown over some Lancashire mills, did not show the enthusiasm expected, and afterwards was asked his opinion of the wonderful machinery he had seen. "Too much noise," he remarked. Being reminded that machinery could not be expected to operate without noise, he said "Yes, but noise means friction; and friction is loss."

Those who have the guidance of business in their hands should be keen to appreciate and never slow to express appreciation when deserved, and so encourage and support those whose duty it is to carry their thoughts and schemes into action. In small undertakings, directing, executing, and supervising may all be combined in one person; and one such man in his time plays many parts. The duties of such undertakings to the public are as varied as those of undertakings of greater magnitude. It is from a responsible directing head that all services must flow; but the complexity of demands upon undertakings makes a properly organized staff imperative. This organization descends much lower down the scale now than was recently deemed necessary. An undertaking developing normally requires a considerable amount of engineering skill; and constructional, mechanical, and electrical engineering knowledge must be combined in a person responsible for general management. Here again we have a matter of degree. Generally, the actual work is beyond the time limit of one individual; consequently several may be charged individually or jointly with the activities of departments. Individuality and originality are not to be discouraged, but before attempting to secure recognition in this direction, you must carefully weigh and appraise the work of others. Then, and not till then, you may strike out in your own line.

THE SELECTIVE FACULTY.

Now the selective faculty is as important in its way as the creative faculty. Take carbonizing as an illustration. Who, when called upon to provide plant for the purpose, would hesitate to view the whole field, selecting in the light of his own special conditions the best means to develop in the required direction, whether gaseous products be desirable, or solid or liquid products, or both, are the controlling factor. The capital charges involved in any particular type or types, and the working costs under the special conditions in which these types operate, and eventual tests of ultimate utility with due regard to costs to consumers have to be deduced.

An industry based upon practical application of chemistry demands a high degree of expert knowledge; and there is no wonder that the chemist is coming into his own, rendering, as he does, increasingly acceptable and valuable service. The acknowledgment of this has been a matter of gradual evolution; but even to-day it cannot be claimed that the industry is making full use of the skill and knowledge of the chemist. Let me give a word of warning to the works chemist who operates among the "infinitely small" matters of daily routine. The very nature of your work may tend to make you introspective; and in observing phenomena it is possible to overlook much they portend. Routine may then become a snare; but investigation and research within the limits of your environments will provide excellent antidotes, and at the same time train and cultivate. Recollect that the results of research work usually express all the small laboratory determinations. All the work must be applied to the touchstone of "main endeavour," and be in harmony with a main stream of thought and action, if it is to be of material benefit in affording contribution to real efficiency.

It is usual to divide the activities of the undertaking into two main departments—manufacture and distribution. There are many instances where these two departments act as though they were separate. Is there any fundamental difference between them? Are they not two arms of the same service designed to the same end—essential parts of the same body? The magnitude of operations and local conditions must necessarily dictate the policy to be pursued; but to secure the greatest efficiency it is essential—indeed, vital—that the two chief departments should act in harmony.

Never before in the history of our country has so much attention been paid to the technical side of education. Our own industry is no exception, and no man indifferently equipped in the technique of an industry can give the best the occasion requires. Indeed, technique in its broadest sense is the keynote of every branch throughout the gamut of our activities.

Similarly, commercial ability must permeate the whole system; and hand in hand with the technical faculty, this does, and will continue to, work wonders. Commercial instinct has really underlain our industry from its inception; but it has been so masked in earlier days by the unique position it held—namely, lack of actual competition—as to have been unrecognizable as such. The application of the sliding-scale was an expression of this, and electrical competition has proved a healthy spur and incentive. Do not for a moment imagine that commercial ability is required only in the sales department. It is fully as necessary throughout all other departments. When to acquired commercial knowledge is added natural commercial instinct, commercial ability is at its highest.

More attention has been given of late years to commercializing the distribution department, mainly because it had lagged behind. Modern competitive conditions have applied the lash. District commercial sections, followed by the formation of the "B.C.G.A.," were indicative of this; and all that has flowed from these movements has been of the utmost benefit to the industry. In this we must exercise a due sense of proportion, and not imagine because of success, this, that, or the other is of greater importance than its fellows. The fact is that the different phases are so interdependent that cohesion and unity are of vital importance. If one member is defective, all suffer.

A word or two as to comparatively recent developments in distribution matters commercially. Distribution differs from other departments inasmuch as it is the department which brings our service to the eye of the public. Intrinsically it is neither greater nor less in importance than the other departments. Advertising necessarily is one phase of the department's activities; for, while there may be truth in the saw "Good wine needs no bush," iteration and reiteration are necessary if the public is to be kept mindful of the services our industry can render. Newspaper advertisements, while useful, are not sufficient in themselves. Good advertising must include every variety of illustration and demonstration, among which the most effective is a satisfied consumer. Mere stunt advertising is worse than useless. The Rev. J. R. G. Wreford, writing, in a recent issue of the "Nineteenth Century," upon "Public Interest" said, "What many people forget, however, is that no stunt will ensure the permanent popularity of any article which is not almost a necessity."

Your President, in an admirable address to you at the opening of the session, placed the issue clearly when he stated "Mere admonition to use more gas will not influence anyone, but service will promote sales indefinitely. Facilities which place appliances easily within reach of our patrons, direct advertising on what to instal and how to use it economically, and sound advice based upon experience will do more than anything to achieve our purpose." I agree with him. There is an American quotation, "Gas without service is of little use to anyone, but gas with service is a necessity. One is mere vapour, the other fuel." This is very apt. In a word, while it is up to us as responsible units in the industry to become thoroughly possessed of the main idea of rendering the best and most efficient service possible, guard against becoming so obsessed as to lose your sense of proportion, for without it your efforts will become unrestrained and unregulated.

The gas industry, in common with public utility undertakings, differs from other industries in that service is rendered at net actual cost, and the return on capital necessary for that service is sharply defined and restricted by those in authority. Consequently no "profit" in the ordinary sense is being made, but simply a bare subsistence rate of return on the capital involved in running the service in the country. We serve in one way or another at least forty million people in this country, and it costs the modest sum in charges upon capital employed from 5s. 6d. to 6s. per person per annum.

There are two main factors which emerge:

1. The actual cost of producing, supplying, and rendering efficiently the service of all branches of our industry.
2. The necessary permissible return upon the capital employed in so doing.

Now it is your duty and privilege as junior responsible officials of this great industry of ours to be constantly attacking these two factors with a view to increasing the utility and efficiency on the one hand, and reducing cost to the public on the other. It depends primarily upon the mental attitude you adopt, and secondly upon the translation of profound thought into intelligent action, as to what the future of our great industry shall be. It was well said of one our master minds "He died learning." If the same can be said of us, individually and collectively, in time to come there can be little doubt but that success will have attended our life's work. But to achieve this we must not forget that constant and unremitting application is absolutely necessary; for at any stage in life, to cease learning and thinking is to become moribund.

The CHAIRMAN remarked that they had been fortunate in having had placed before them the views of one ripe in experience. Many of the points dealt with were of vital interest to the industry.

Mr. T. A. CANNING (Newport) said it gave him great pleasure to propose a vote of thanks to Mr. Shadbolt. He was to be congratulated upon an excellent lecture imparted in a most lucid fashion. They had been told that the problems of the future would rest with them; and the address they had received would have the result of inciting them to greater efforts to equip themselves in a thorough and proper manner to meet their responsibilities. Attention had been drawn to the Education Scheme and to its flexibility; but the danger of making it too flexible would have to be guarded against, and he suggested that a happy medium between flexibility and rigidity combined would conduce to the extension and ultimate success of the scheme. Mr. Canning agreed that the relationship between the commercial and technical staffs could not be too strongly

stressed, and that a spirit of helpfulness between the various departments was to the good, while indifference was fatal.

Mr. JOHN (Aberdare) seconded the vote.

On the proposition of the SECRETARY, seconded by Mr. MARTIN (Merthyr), a vote of thanks was accorded to the Chairman and Directors of the Cardiff Gas Light and Coke Company for their hospitality and the facilities they had afforded the Association.

INTERNATIONAL COMMISSION ON ILLUMINATION.

(*Continued from p.* 350.)

Continuing their programme, the members of the Commission—under the presidency of Dr. Sharp—next considered a report of the International Committee on Lighting in Factories and Schools, which had been prepared by Mr. L. B. MARKS, as Chairman of that Committee.

LIGHTING OF FACTORIES AND SCHOOLS.

The reporter first alluded to the communication he had presented at Paris in 1921, in which lighting legislation in the United States had been discussed with special reference to (*a*) factories, mills, and other workplaces, and (*b*) school buildings. Codes of factory lighting were then effective in six states—Pennsylvania, New Jersey, New York, Wisconsin, Oregon, and California. Since that time factory lighting codes have become effective in four other States—Ohio, Oklahoma, Massachusetts, and Washington—making ten in all, having an aggregate population of 43 millions. The Third Report of the Departmental Committee on Lighting in Factories and Workshops was issued in 1922 by the Home Office of Great Britain. The rules in that report relating to intensity of illumination and glare, and the rules, regulations, and recommendations of the American Standard Code of Lighting Factories, Mills, and other Workplaces were now submitted for discussion.

In considering the question of illumination required, the need for legalized minimum requirements was pointed out. The plan of including suggested lighting standards for "recommended practice" for different classes of work has proved a good one, and has been carried out in all American codes. But it is one thing to suggest, and another to insist. In the United States, it has been found that suggestion goes a long way, but insistence is often necessary for the protection of the eyesight of the workmen. Great Britain prescribes:

> In defining adequate illumination for processes carried on in factories and workshops, definite legal minima shall not at present be imposed; but a specification of minimum standards of illumination as "recommended practice" for (*a*) fine work and (*b*) very fine work shall be issued. The standard of illumination for processes grouped under (*a*) shall not fall below 3 foot-candles, and for processes grouped under (*b*) shall not fall below 5 foot-candles.

Passing on to the consideration of avoidance of glare and distribution of light, Mr. Marks observed that no practical difficulty has been found in applying in practice the rule relating to illumination intensity required on the space and at the work. Factory inspectors have found it a simple matter to use an instrument such as the foot-candle meter to check the lighting standards in different parts of the country. Unfortunately, however, no such simple method has been available to determine compliance with the glare rule. In the United States an attempt has been made to classify commercial light sources from the standpoint of glare, taking into account five principal factors of glare as follows: (1) Brightness of source; (2) total volume of light; (3) location in the field of view; (4) contrast with background; and (5) time of exposure. The British Committee take cognizance of only two of these five causes of glare. No cognizance is taken of the total candle-power in the direction of the eye, of the contrast with the background, or of the time of exposure of light sources within the field of vision.

Referring to the code of lighting for school buildings, Mr. Marks said that in 1923 the Illuminating Engineering Society, in conjunction with the American Institute of Architects, undertook the revision of that Society's Code of Lighting School Buildings, under the auspices of the American Engineering Standards Committee. The resulting revised code was officially approved by that Committee in June, 1924, and is now known as the American Standard. As to illumination required, the minimum foot-candles for lighting school buildings are in some cases higher, for the same general class of work, than those on the American standard factory code. In the glare, diffusion, and distribution of light divisions, the school code rule on avoidance of glare is the same as that set forth in the American standard factory code. With a view to minimizing accidents on stairways of school buildings, a new clause has been introduced in the revised code as follows: "The nosing of treads on all stairs used as exits should be such as to show the edge of each step by contrast when viewed as in descending." Regarding exit and emergency lighting, as a safety precaution in school lighting it was thought desirable to specify that the exits from classrooms and auditoriums must be indicated by adequately illuminated signs in all rooms or auditoriums having an illumination less than 1-10th foot-candle.

Regarding inspection and maintenance, the factory lighting code does not contain a special rule on these items; but suggestions and recommendations on them are included in that section of the code devoted to the discussion of the rules. The rule relating to illumination required specifies the minimum foot-candles that shall be maintained on the space or at the work. The inspector is therefore not directly concerned with the question of renewals of burned-out lamps, cleaning of globes and reflectors, or cleaning of windows and sky-lights, except to the extent that lack of proper maintenance may result in a reduction of the effective illumination to a level below the mandatory minimum. The case of the school lighting code is somewhat different. Though the school authorities are held responsible if the illumination falls below the minimum specified in the code, it was thought desirable to insert in the school code a special rule relating to inspection and maintenance.

To Mr. Marks' report was appended a copy of the rules, regulations, and recommendations for the lighting of factories and schools. It was submitted for discussion as a basis of international agreement.

Resolutions embodying these recommendations were then put before the Commission, and discussed.

A paper entitled "Travaux de la Commission de l'Eclairage des Usines et des Ecoles du Comité National Français de l'Eclairage," by M. Maurice Leblanc, was reviewed by M. Bossu.

In this paper, after general considerations had been discussed, details were given of good lighting in various industries. The qualities of natural and artificial lighting were touched upon, and the paper concluded with a few words on the importance of adequate lighting of exit passages.

INDUSTRIAL LIGHTING IN ENGLAND.

Mr. LEON GASTER (Hon. Secretary of the Illuminating Engineering Society) was then called upon to present in abstract his paper on "Some Further Developments in Industrial Lighting in England." Its scope included references to the two reports issued shortly before the war by the Joint Committees of the Illuminating Engineering Society. These reports were commended to the attention of school managers and Local Education Authorities in the 1912 report of the Chief Medical Officer of the Board of Education.

Mr. Gaster expressed the opinion that the most promising basis of international action was to promote agreement on principles of lighting, leaving to the various countries the decision as to how best they can be applied in practice. A sketch was given of developments of industrial lighting in England during the past few years, and reference was made to the following recommendation relating to the avoidance of glare, contained in the second Home Office Report:

> Every light source (except one of low brightness) within a distance of 100 ft. from any person employed shall be so shaded from such person that no part of the filament, mantle, or flame is distinguishable through the shade, unless it be so placed that the angle between the line from the eye to an unshaded part of a source and a horizontal plane is not less than 20°, or in the case of any person employed at a distance of 6 ft. or less from the source not less than 30°.

Considerations resulting from the application of this recommendation were reviewed. The author declared: "We have as yet no simple and positive means of determining when an installation is 'glaring.'" Even the widely-quoted limit of 5 foot-candles per square inch, based apparently on the average brightness of a white sky, is somewhat difficult to substantiate scientifically, for it is evident that the expanse of white sky overhead is somewhat different from an isolated light source of small dimensions. It is also now recognized that glare is something of a matter of *contrast* between a source and its surroundings, and that in some cases the candle-power of a source, apart from its brightness, may be a factor of importance.

The third report of the Home Office was analyzed. It was shown to deal mainly with the question of working illumination. The Committee issued a schedule of industrial operations divided into the classes of "fine" and "very fine." The report suggests that lines of future research should include: (1) The collection, for every purpose concerned, of a sufficient number of observations to give some indication of the best existing practice; and (2) experimental research with the object of discovering the conditions of illumination desirable on physiological and psychological grounds. Ample proof is now forthcoming of the relation between lighting and production and safety. It therefore seems reasonable to expect the chief industries to co-operate in this work and assume partial responsibility for a scheme of research on the lines indicated—possibly through the Research Associations, where they exist.

In England a considerable amount of useful work has been done by the Industrial Fatigue Research Board, who have shown, in the case of several industries, how inadequate illumination causes fatigue and prejudicially affects output. In the cotton and silk industries, the average output by daylight is 10 p.ct. better than it is by the present artificial lighting con-

ditions. The National Institute of Industrial Psychology have also conducted some useful research work. They have shown that a higher candle-power from the miner's lamp enabled a group of workers to produce more coal in a given period. It is to be hoped that the Committee on Illumination, established under the Department of Scientific and Industrial Research, will be able to promote useful researches of this kind, undertaken with the aid of the industries concerned. This applies to the experiments at present being conducted on the lighting of printing works. Other problems will in due course be relegated to sub-committees, each of which will contain, not only lighting experts, but architects, physiologists, and others interested. Co-operation will also be invited from the industry investigated. In the National Physical Laboratory there is also an institution admirably adapted to the carrying-out of scientific tests on specific problems by which general investigations on conditions in actual practice require to be supplemented. The willing co-operation of employers and workers is necessary for the solution of the problem of improving industrial lighting. Generally speaking, the first step is to gain the confidence of the workers in the industry studied, and so secure their willing co-operation in the tests.

In conclusion, Mr. Gaster expressed the view that minimum legal standards of illumination should be based primarily on considerations of safety and health. Supplementary recommendations, serving as an indication of good practices, should only be fixed after consultation (where possible) with the joint councils of the industries concerned. Naturally, the economic value of increased illumination should also receive due consideration; and, where the circumstances justify it, values considerably higher than those representing "good practice" may be recommended, in the interests of efficient production. Industrial lighting is now a subject of international interest, as was aptly illustrated by the International Labour Office of the League of Nations last year. The author hoped that the present meeting of the International Commission on Illumination would result in the initiation of further researches, and that at forthcoming meetings there would be further substantial progress to record.

At the last moment a lengthy and highly technical paper entitled "Quelques Recherches sur les Phénomènes d'Eblouissement," by M. U. Bordoni, was put in. It was reviewed by M. Bohm.

Discussion.

Mr. MARKS stated that his report represented the consensus of opinion of authoritative investigators, and the data had been approved by leading organizations in various countries. The report had been signed by three out of the five members constituting the Committee on Factory and School Lighting.

Mr. WALTER DUNN appreciated the value of the report, but was afraid the Commission could not do justice to all the information put forward for discussion, as M. Bordoni's extremely interesting communication had only just been placed in their hands.

Mr. GASTER suggested that, before any resolution was submitted, the members should have an opportunity of examining M. Bordoni's views.

Dr. KERR said that in a poor light the eye got extremely sensitive, and the glare became simply a function of the adaptation of the eye. The most important thing in schools was to limit the brightness of the source of light.

Professor FABRY thought it would be better to take the report of the International Committee as a basis for discussion, especially if the discussion was to result in the adoption of a definite resolution.

M. BOSSU agreed.

Colonel EDGCUMBE concurred with Mr. Sharp that a careful consideration of the method of the working of the sub-committees was very necessary, and suggested that it would help matters if the Chairmen of all sub-committees were asked—(say) eighteen months after their appointment—to send in an interim report to headquarters as to what had been done. He was satisfied that the present report did embody current practice, and thought the Committee might be asked to suggest before the next sitting any modifications they considered necessary.

Dr. HYDE proposed that the existing Editing Committee might put the words of the resulting resolution into French, and at the plenary meeting on the following day a separate Editing Committee could be appointed to put the figures into French form.

(To be continued.)

Parkinson and W. & B. Cowan, Ltd.

Considerable extensions are proposed by Messrs. Parkinson and W. & B. Cowan, Ltd., the amalgamation of two of the oldest gas meter businesses in Great Britain, operating 22 factories in Great Britain and the Dominions. An increase of capital is required for the development of the gas stove and cooker business and the Company's operations generally. The debenture and share capital authorized is £1,200,000, of which £834,712 has been issued.

Yorkshire Junior Gas Association.—We are unfortunately compelled to hold over for a week our report of a meeting of the Association on the 21st ult., at which a paper was read by Mr. G. Griffiths, of Bradford, on the subject of "Carbon Bisulphide in Coal Gas—Its Formation and Elimination."

REGISTER OF PATENTS.

Shaking Screens.—No. 219,985.

ROBINS CONVEYING BELT COMPANY, of New Jersey, and SAVAGE, P. S., of Buffalo.

No. 18136; July 29, 1924. Convention date, July 31, 1923.

The principal objects of the invention are to provide a screen in which an improved shaking effect is obtained, resulting in more certain and effective separation of the coarser and finer particles, greater output of work, and less abrasion and wear of the screening grid. The patentee claims that a suitable degree of rapidity and amplitude of vibration is developed without involving any liability of undue wear or racking. The vibratory throw of the screen frame may be readily and certainly regulated in order to adapt the screen to the individual characteristics—*e.g.*, weight, consistency, and form—of the material to be treated.

The screen frame pivots about an operating eccentric, and has imparted thereto during each reciprocation a plurality of snapping vertical impulses through the intervention of spring or resilient means acting on the frame in consequence of the operation of the eccentric. The resilient means, which may consist of a leaf spring or springs, are by preference connected to the screen at a distance from the eccentric, and at the upper end thereof. The springs are co-ordinated to the eccentric so that the ends of the screen frame move in the same vertical directions at the same periods of time.

Gas Valves.—No. 227,213.

ROBERT DEMPSTER & SONS, LTD., HORSFALL, J. E., and LUMB, H., all of Elland.

No. 25,769; Oct. 16, 1923.

This invention relates to valves for controlling, reversing, and bypassing the flow of gas through purifiers, condensers, &c. [See "JOURNAL" for March 26, 1924, p. 791.] In specification No. 211,269 there was described an arrangement of screw-down valves operating in conjunction with one or more regulating valves. The present invention has for its chief object to enable all the various directions of flow to be produced with a reduced number of valves, to economize space and make the apparatus more compact, and to reduce the number of working parts. Instead of employing a separate screw-down valve for controlling each upper and lower aperture, or upper, intermediate, and lower aperture as described in the prior specification, a single rotary plug valve is arranged in communication with the regulating valve, and capable of controlling apertures communicating with the top, middle, and bottom thereof. The rotary plug valve may be made in the form of a hollow drum open at one end, and having an opening in one portion of its periphery. This drum is mounted in a casing fixed within the purifier to the front wall thereof. This casing has an upper and a lower branch opening, and, if desired, an intermediate branch opening. The open end of the drum coincides with an opening in the front wall of the purifier, and communicates with the regulating valve by a branch pipe attached to the front wall of the purifier and to the regulating valve casing. The rotary plug valve is rigidly connected with a spindle supported at one end by a portion of the valve casing, which is preferably made detachable, to enable the valve to be removed without disturbing the casing. The other end of the spindle passes through a gland or bearing in the branch pipe, and is fitted with a hand wheel or other device for turning purposes. In applying the apparatus to a range of purifiers, a single regulating valve and rotary plug valve are used at each end of the range, and the valves are arranged in pairs for connecting adjacent purifiers.

No. 227,623.

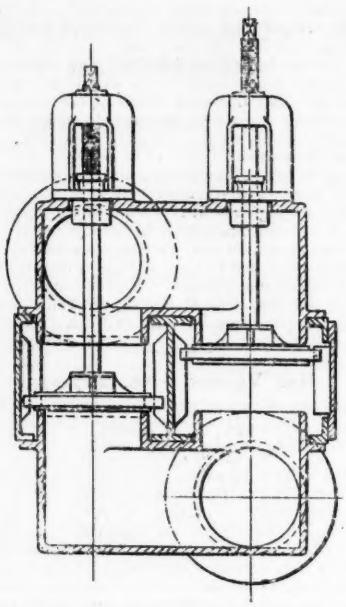
No. 686; Jan. 10, 1924.

According to this invention, a casing adapted to be connected with a main inlet and a main outlet is provided with two valves which control two openings in the casing and enable such openings to act as an inlet and outlet to and from the purifiers, or *vice versa*. The valves may be of the rotary or of the disc type. When a rotary valve is employed, it may be made in the form of a cylinder closed at one end and provided with two branch passages which may be arranged at an angle of 180° to one another. The cylinder so formed is concentrically mounted within an outer cylindrical casing formed with a main inlet aperture, a main outlet aperture, and with two openings which are controlled by the branch passages to enable them to act as an inlet and outlet to and from the purifiers. The end of each branch passage constitutes a separate valve, and its face makes a tight joint with the wall of the outer cylinder. The main inlet to the outer cylinder may be arranged in line with the open end of the inner cylinder; and when the latter is turned to cause one of its branch passages to register with one of the openings in the outer cylinder, gas from the main inlet enters the inner cylinder, passes through the branch opening therein to the range of purifiers, and returns from the latter to the annular space between the inner and outer cylinder, and thence through the main outlet in the outer cylinder.

When the inner cylinder is turned to bring the other branch passage into line with the other opening in the outer casing, the direction of the flow of gas to and from the purifiers is reversed. The inner cylinder may be keyed upon a central shaft, to which motion can be imparted by hand or by gearing. The end of the outer cylinder cover through which the shaft passes may be fitted with a stuffing box, and the other end of the shaft may be keyed to a perforated disc which may be rotatably mounted in the cover at the other end of the outer cylinder.

When two disc valves are employed, each of the valves may be mounted between two discs in a casing formed at one side of the valves

with a main inlet and at the other side with a main outlet, and with two openings which may be situated midway between the valve seatings. In this construction, when one valve is closed against one seating—for example, a lower seating—and the other valve is closed against the upper seating, gas entering the casing at the main inlet passes to the range of purifiers through one of the openings in the casing, and returns through the other opening and passes out of the casing by way of the main outlet. The accompanying diagram shows a vertical section of the valve.



Vertical Section of Dempster Valve.

Separating a Gas from a Mixture of Gases. No. 227,309.

THE SILICA GEL CORPORATION, of Baltimore.

No. 6296; March 11, 1924.

This invention is a development of the process of Patent No. 137,284. In the prior process, the gas-mixture was fed into a bed of adsorbing material, and the process was not continuous. The present invention has for its main object to provide an improved continuous adsorption process in which the adsorbing material is used over and over again in a closed cycle, thus effecting great economy and efficiency in working. It relates to that type of process in which the finely-divided material for treating the gas is fed into the gas-stream.

The process, according to this present invention, consists in injecting finely-divided adsorbing material, having pores of such size that it will adsorb water vapour to such an extent as to contain not less than about 10 p.ct. of its weight of water when in equilibrium with water vapour at 30° C. and a partial pressure of substantially 22 mm. of mercury, into a stream of the gas-mixture from which it is desired to separate one or more constituents in such manner that the adsorbing material is carried along in suspension in the gas-stream, separating the adsorbent from the gases after it has adsorbed the desired constituent, liberating this constituent from the material, and returning the latter into the stream of gas-mixture for use again. Preferably, the adsorbing material is silica gel having pores of such size that it will adsorb water vapour to such an extent as to contain substantially 21 p.ct. of its own weight of water vapour when in equilibrium with water vapour at 30° C. and a partial pressure of 22 mm. of mercury.

The method may be employed for the separation from each other of any two gases or vapours, provided they have a sufficient difference in their boiling points. The most common examples of such separations are the removal of moisture from air or other so-called permanent gases, and the separation and recovery of the vapours of volatile liquids, such as sulphur dioxide, ether, alcohol, acetone, benzole, gasoline, &c. In such cases, the adsorption is effected at normal atmospheric temperature or the temperature of the cooling water available.

An aim of the present invention is the provision of a plurality of adsorbing units arranged to act one after the other on the stream of gases. A further aim is to feed the adsorbing material from one unit of the apparatus to another in a counter-direction to the movement of the gases. Another aim is to provide means to prevent passage of gases through the adsorbent discharge pipe of the separators.

Safety Catch for Gas Taps.—No. 227,372.

MADDISON, S., of Lincoln.

No. 17,219; July 18, 1924.

According to this invention, the thumb-piece of a gas tap is formed with a notch into which a locking arm fits when the tap is in the closed position. The arm or lever is mounted on a boss formed integral with the casting, and is balanced so as to fall into the notch or rest on the tap unless it is held up by the operator.

Measuring Skips for Coke, &c.—No. 227,580.

STRACHAN & HENSHAW, LTD., GROSSMITH, G. W., and SARGANT, T., all of Bristol.

No. 29,987; Nov. 28, 1923.

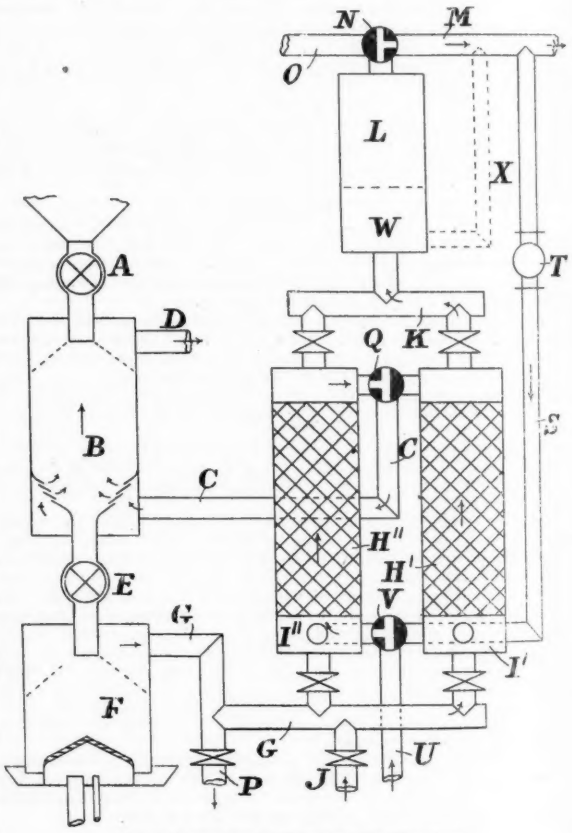
The object of this invention is to obtain satisfactory automatic measuring of material and the filling of skips by a simple mechanism. The mechanism consists in its simplest form of one movable part only—the measuring and releasing of the coke, and the suitable positioning of the skip, being effected without the use of fixed or movable guides, and without the necessity for hinged or sliding extension pieces to the filling shoot. Below a hopper is mounted a fixed measuring chamber capable of holding a suitable volume of coke for filling one skip, its upper and lower ends being open for receiving and discharging the coke. The flow of the material through the opening of the measuring chamber may be controlled by two valve plates fixed to a bar, by which they are connected; the arrangement in relation to the openings being such that, as the upper valve is opening to pass the charge of coke into the measuring chamber, the lower valve is closing to retain the charge, and conversely. The operation of the double valve device is effected by attaching a lever, which projects outwards from the apparatus in such a manner that it intercepts the skip in its descent, the weight of the skip providing the energy necessary to operate the apparatus—being sufficient to overcome a return balance weight and the resistance of the valves due to pressure of the coke. The positioning of the lowering skip simultaneously releases the measured charge, at the same time cutting off further flow from the main storage bunker.

Complete Gasification.—No. 227,726.

RUDE, J., of London.

No. 15,497; June 27, 1924.

This system of complete carbonization is best described with reference to the accompanying diagram.



Rude's System of Complete Gasification.

The fuel is supplied through a mechanical feed valve A to the distilling retort B. The heating fluid, coming from one of the regenerators H1 or H2, enters through the pipe C, and passes, after having performed the carbonization in B, together with the distilled products, through the outlet D to the cooling and cleaning plant. The carbonized fuel descends through a second feed valve E to the water gas producer F, to be completely gasified. During the blow run of the producer F, the blow gas passes through the pipe G to one of the regenerators (for instance, H1), at the entrance of which it is burned partly or completely in the combustion chamber I1 with air admitted through J. After having heated the brickwork in the regenerator, the gases, still in possession of a certain amount of heat, are conducted through the pipe K to the waste heat boiler. From here they are discharged through the pipe M to the stack.

With regard to the route taken by the water gas produced during the gasmaking runs, there are three alternatives. The first is to let it follow the route of the blow gas through the regenerator H1 and the boiler L, and then lead it away by means of the valve N through the separate pipe O to the scrubber. The second alternative

consists in leading the water gas away at once through the pipe P before its admission to the regenerator. The third alternative is to use the water gas as heating fluid for the retort—for instance, by a connection between pipes C and G (not shown in the drawing), or after its passage through the regenerators by leading it through the valve Q and the pipe C to the distilling retort. Both in the second and third alternatives the boiler receives heating gas only during the short blow runs. To compensate for this and to ensure a permanent heating of the boiler, a circuit of gas is established between the gas pipe or boiler flue M leading from the boiler and alternately to the combustion chambers of the regenerators by means of a pipe S and a gas pump T. This gas circuit may be intermittent or continuous. If the blow gas is not completely burned in the combustion chambers, a combustion chamber W may be arranged at the entrance of the boiler. This combustion chamber may be fitted with checkerwork, and thus constitute a third regenerator. The circuit of gas for the heating of the boiler may be directed through this third regenerator, as shown by dotted lines (pipe X).

In case the blow gas should not contain heat enough for the heating of the third regenerator, a small amount of water gas may be employed. While one of the regenerators is being re-heated, the auxiliary gas passes through the pipe U and is directed to the other regenerator by the valve V. This may go on continuously or intermittently. In case the auxiliary gas is used continuously as a heating fluid for the distilling retort, the regenerators may also be used as carburettors. It may be found advantageous to use one distilling retort for several producers. The same pair of regenerators may co-operate with several water gas producers.

When the water gas is removed before its admission to the regenerators, it may be united with the gas from the outlet D, and be conducted to the gas cleaning plant, whereupon both gases may, after removal of the surplus gas, be returned as auxiliary gas through the pipe U to the regenerators to serve as the heating fluid for carbonization. This arrangement permits any desirable amount of gas to be circulated as heating fluid through the distilling chamber. In the alternative, when the water gas is directed straight to the regenerators and used as heating fluid during gas-making periods, the auxiliary gas, which performs the same task during blow periods, may in a similar way consist of returned or circulating gas. It may be advantageous to introduce steam to the hot coke at the bottom of the retort.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 25.]

Nos. 4207-4900.

BRADSHAW, G. W.—"Compressor, or charging-apparatus for gas-turbines." No. 4207.
DOZY, J.—"Safety devices for gas lines." No. 4561.
LAW, G. J.—"Gas lamp." No. 4243.
PARKER, C. H.—"Retorts for distillation of coal, &c." No. 4533.
PARNHAM, A. E.—"Prepayment meters, &c." No. 4440.
SALERNI, E. M.—"Distillation, &c., of carbonaceous, &c., materials." No. 4365.
SCHUTZ, A. F.—"Absorbing or purifying gases." No. 4515.
SCHUTZ, G. A.—See Schutz, A. F. No. 4515.
THOMSON, W.—See Law, G. J. No. 4243.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The further Standing Orders applicable to the Uckfield Gas and Electricity Bill have been complied with.

Bills read a second time, and committed: Horley District Gas Company (Electricity Supply); Uckfield Gas and Electricity.

Bills committed: Bexhill Corporation, Blackpool Improvement, Hoylake and West Kirby Urban District Council, Mansfield Corporation, Oldham Corporation, Rochdale Corporation.

The Dundee Corporation Water and Gas Order Confirmation Bill was brought from the Commons, read the first time, and deemed to have been read a second time and reported from the Committee.

HOUSE OF COMMONS.

Progress of Bills.

Dundee Corporation Water and Gas Order Confirmation Bill: Considered; read the third time, and passed.

Requisitions to withdraw their petitions against the Gas Light and Coke Company Bill have been deposited by various Corporations and Councils.

Bill read a second time, and referred to the Examiners: Gas Light and Coke Company.

Bill committed: South Metropolitan Gas Company.

Fixation of Nitrogen.

Mr. BECKETT asked the Secretary of State for War if any reports of the mission which was sent to Oppau to inquire into German methods of fixing nitrogen from the air were available; and whether it was intended to publish them?

Sir L. WORTHINGTON-EVANS replied that the report was made by the British mission which visited the chemical works at Oppau. it was intended to publish them.

Scientific Treatment of Coal.

Mr. GEORGE HALL has given notice that he will call attention to the need for scientific treatment of coal, and move a resolution.

Coke.

Mr. HANNON asked the Secretary for Mines the number of coke ovens in use; the quantity of metallurgical coke made in the years 1922, 1923, and 1924; and the amount of coke consumed in blast furnaces for the same years.

Colonel LANE-FOX said that for the years 1922 and 1923 the information was as follows:

Year.	Number of Coke Ovens in Use.	Metallurgical Coke Made.	Coke Consumed in Blast Furnaces.
		Tons.	Tons.
1922	10,897	9,035,741	5,819,084
1923	12,639	13,418,314	8,632,600

The figures for 1924 are not yet available.

Birmingham Gas Department and the Rates.—The Birmingham Corporation Gas Committee have, as already stated, made a contribution of £42,000 to the relief of the rates, in order that they may be kept at the present level of 16s. in the pound. This decision, it was intimated at a meeting last week, was arrvied at only after considerable discussion, owing to the anticipated poor results of the year's trading, due to the slump in the market value of residual products. The money for the relief of the rates will be taken from the reserve fund.

LEGAL INTELLIGENCE.

A RESIDUALS CONTRACT.

In the Court of Session, at Edinburgh, before the Lord President and Lords Cullen and Sands, there was heard a reclaiming note for the pursuers in the action of *Brotherton & Co., Ltd., v. Glasgow Corporation.*

In October, 1904, the pursuers entered into a contract of lease and agreement with the defenders, whereby they acquired from them right to certain chemical works, buildings, and ground appertaining to the gas-works at Provan, and also to the tar and ammoniacal liquor produced by the defenders in the course of their manufacture of gas. The duration of the contract was for five years from July 1, 1904; but, on its expiry, a new contract for a similar period was entered upon. A third contract extended the arrangement for an indefinite period. The contract was finally terminated on July 31, 1920, by the defenders, who took over the works on that date and had since carried them on for their own behoof. The parties were at issue as to the construction of an article of the contract, which dealt with the prices to be paid by the pursuers for the tar and ammoniacal liquor supplied to them by the defenders under the contract.

In the Outer House Lord Blackburn assoilzied the defenders, with expenses. The Court adhered to the interlocutor of the Lord Ordinary, with additional expenses.

THE UNLIMITED SCALE RULE.

Lord Cullen, who gave the leading opinion, remarked that the defenders said that, if the written lease and agreement did not itself provide for a rule of payment for the cases in question here, the parties by implied contract, deducible from their course of dealing, provided a rule, which was just the rule of the unlimited scale of 1904. His Lordship had no hesitation in preferring the defenders' contentions. During the whole period between 1909 and 1920 the defenders openly proceeded on the basis of the unlimited scale in making up their monthly accounts. The pursuers accepted these accounts, and made their payments without challenging in any way the basis on which the accounts were stated; and after 1914 the defenders annually renewed the lease and agreement without any notice or hint from the pursuers that the rule of prices on which they were proceeding was not being accepted. Indeed, it was shown that the present challenge of the rule was an afterthought, originating in May, 1920. In the circumstances, it appeared to his Lordship that a contractual rule of payment was to be inferred from the parties' dealings, and that this rule was the unlimited scale rule.

Dublin Gas Company Sued.

In the High Court, Dublin, before Mr. Justice Sullivan, a jury returned a verdict for plaintiffs in an action by Patrick Brennan and his wife against the Alliance and Dublin Consumers' Gas Company, claiming damages for personal injuries, and, in the case of the male plaintiff, for injury to a motor van, by, as alleged, the neglect of defendants' servants in the opening and refilling of a trench at Pigeonhouse Road, Dublin. The husband was awarded £150 and the wife £100, and judgment was given accordingly, with a stay of execution.

Reconstruction of Morecambe Gas-Works.—The Ministry of Health, who recently held an inquiry into the application of the Morecambe Corporation for a loan to cover the cost of extensions to the gas-works, and the installation of a new retort house and carbonizing plant, have approved of the proposals as put forward by the Gas Engineer (Mr. T. W. Barratt), and have given the necessary sanction for the borrowing of the amount applied for. The Unemployment Grants Committee have also contributed on the usual terms towards the cost of the work. The new horizontal carbonizing plant has been entrusted to Messrs. Drakes, Ltd., of Halifax.

MISCELLANEOUS NEWS.

LOCAL AUTHORITIES AND THE GAS REGULATION ACT.

Deputation to the Board of Trade.

A deputation of representatives of the municipalities and other local authorities owning gas-works who have not yet applied for an Order under section 1 of the Gas Regulation Act, waited last Wednesday on Mr. P. W. L. Ashley, C.B. (Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade), and Mr. H. C. Honey (Director of Gas Administration), at the offices of the Board—see minutes of the National Gas Council, "JOURNAL," Feb. 18, p. 400. The deputation was led by Alderman F. S. Phillips (Salford), who was accompanied by Mr. W. W. Woodward (Salford), Alderman J. H. Lloyd (Birmingham), Mr. A. W. Smith (Birmingham), Mr. Charles Wood (Bradford), Councillor G. Dale (Warrington), Mr. F. Peel (Tyldesley-with-Shakerley), Mr. C. Waymouth (Torquay), and Mr. T. H. Poulson (Stafford).

Mr. ASHLEY, welcoming the deputation, said he and Mr. Honey were glad to have the opportunity of meeting them. The Gas Regulation Act had now been in operation for 4½ years, and under section 1 it was open to gas undertakings to apply for an Order substituting the therm basis of charge for the volumetric basis. After two years from the passing of the Act the Board of Trade were empowered [under section 1 (5)] to make compulsory Orders; it obviously being the intention of Parliament that the new basis should ultimately be adopted throughout the whole of the gas industry. To the local authorities who had not yet applied for an Order the Board of Trade had given 2½ years' grace; but the time had come when it was necessary for the Board to decide what they were going to do to carry out what was clearly the intention of Parliament. The members of the deputation represented undertakings which had not yet seen fit to apply; and in order that the Board might be in a position to determine their course under the sub-section mentioned, it seemed desirable that there should be a meeting of this kind, to ascertain what were the causes which had prevented these local authorities from making an application hitherto, and what were their views on the general question involved.

Alderman F. S. PHILLIPS said that on the previous day a very largely attended meeting of representatives of municipalities and other local authorities owning gas-works had been held, at which there was a full discussion of the situation, and the result was the appointment of the deputation to represent to the Board of Trade what was the position, as they saw it, with regard to the Gas Regulation Act. Of course, there was a very definite and clear advantage to gas companies in adopting the Act—it remedied their position with regard to their dividend where a sliding-scale and similar provisions were in operation—but inasmuch as local authorities did not pay a dividend, the situation in their case was of an altogether different character, and the adoption of the Act would impose burdens upon them without corresponding advantages. It should be borne in mind that, while a company trading for profit regarded that profit as a very essential part of their business, the local authorities owning undertakings were supplying themselves, because the ratepayers were the owners of the works. They appointed representatives to manage their affairs; and if there was anything in the management of those affairs which did not please the ratepayers, they had it in their own hands to change their representatives. Thus they were not in need of the protection that one might suggest operated in the case of consumers supplied by a company, upon the Board of which the ratepayers had no representation. Putting it shortly, the position was that the adoption of the Act did not present to local authorities the advantages which accrued to companies; the primary object of the Act being to remove the financial hardships of the Companies.

Mr. ASHLEY: The primary object?

Alderman PHILLIPS said that, at any rate, one of the primary objects was to remove financial hardships of companies. It did not give the local authorities any relief, but imposed considerable financial burdens upon them. For instance, at Salford there had been trouble with regard to testing for many years with half-a-dozen of the outside districts supplied. Those districts had opposed the Salford Corporation in Parliament, and the Corporation appeared to have no end of trouble in front of them, until at last they appealed to the Local Government Board to hold an inquiry. This was done, and in 1912 a Provisional Order was passed which settled this matter of testing and various other questions; and from that time until to-day there had been absolute peace. He would be very sorry indeed to disturb that situation; but if he understood the provisions of the Gas Regulation Act at all, they meant that every one of those outside districts, or the Lancashire County Council, might claim to appoint their own testing representatives, thus disturbing the situation which was giving perfect satisfaction at the present time. While the local authorities agreed that they should use every endeavour to maintain in their mains a pressure equal to that prescribed by the Act, they considered the regulations made under the Act with regard to pressure were irksome and unnecessary, particularly so far as such regulations related to pressure in the consumers' own service pipes, over which the local authorities had no control. There were many cases where there were long service pipes (the property of the consumer), over and above the 30 ft. prescribed, and he could give instances from experience at Salford in which the owners of those service pipes, though dissatisfied with the conditions of their gas supply, had still refused to replace them.

Mr. ASHLEY asked whether the circumstances of a local authority differed from those of a company in this respect.

Alderman PHILLIPS replied that they did not in that respect so much as in others. Continuing, he said the local authorities considered that the interests of gas consumers who were owners of the undertaking were best served (in these days of keen competition from other sources of light, heat, and power, in many cases not supplied by the local authority) by giving the undertakings as much freedom of action as possible to meet the requirements of their consumers, without being hampered by additional regulations and expenses which must tend to increase the price of gas.

Mr. ASHLEY pointed out that this competition existed, of course, between gas companies and other sources of light, heat, and power.

Alderman PHILLIPS agreed, but reiterated that the local authorities had not the advantages derived by the companies from the adoption of the Act. He also pointed out that at the present time there was a great slump in the value of residual products, and in many cases there would have to be an advance in the price of gas.

Mr. ASHLEY asked what would be the increase in the charge to the consumer in Salford as the result of adopting the provisions of the Act.

Alderman PHILLIPS said that, in the first place, they would have to make a contribution to the Gas Fund. In his case he supposed this would be something under £500 per annum.

Mr. ASHLEY asked what was the value of the sales on which that was based.

Alderman PHILLIPS replied that it was about £300,000.

Mr. ASHLEY remarked that this represented about one-sixth of 1 p.ct.

Alderman PHILLIPS pointed out that the undertakers had to face demands for increased wages.

Mr. ASHLEY said this was no doubt the case, but he did not think very much stress could be laid on the financial burden.

Alderman PHILLIPS replied that it was one factor among many, all tending in the same direction; and therefore it must be taken into account. Continuing, he said that the therm system afforded a means of direct comparison between the price charged for gas by different undertakings in different districts; but in the opinion of the local authorities this advantage did not compensate for the many disadvantages they would be subject to under the Act. The change to the therm system of charging would be of no advantage to the gas consumer, as the system in itself was no greater safeguard to the consumer than the present one. It was merely an arithmetical calculation, carried out at some considerable expense in the offices of the gas undertaking. The real safeguard to the consumers, if they, as owners of the undertaking, needed one, was the systematic testing already being done by all the large gas undertakings and a great many of the small ones. With regard to the increase in the price of gas which would have to be made shortly, he pointed to the trouble which arose in London when the therm system of charging was adopted. Unfortunately, the change happened to be coincident with an increase in the price of gas, and, therefore, it gave some ground—good, bad, or indifferent—for the outcry.

Mr. ASHLEY said that it very quickly disappeared.

Alderman PHILLIPS pointed out that there had been an inquiry.

Mr. ASHLEY agreed, and said it was an inquiry referring to the whole country. Since then nothing had been heard of the trouble. He could not think that the constituents of Salford were less intelligent than the constituents elsewhere.

Alderman PHILLIPS said that, after all, it was not proposed to alter the meters. They were measuring by volume. He could look at the dial of his meter and could see how many thousands of c.ft. he was burning, but he received a bill which translated this into therms, giving him the trouble to compare the two systems of charging.

Mr. ASHLEY said that it was not a trouble, and could be done in two minutes. This was not the point.

Alderman PHILLIPS said that at the meeting on the previous day, though the actual number of representatives was not ascertained, he believed he was within limits when he said that there were over 100 present. He knew that there were others not present who were in the same position. The following resolution represented the general intention of the meeting:

> "This representative meeting of municipalities and other local authorities owning gas-works hopes that the Board of Trade will not enforce the Gas Regulation Act, but leave its adoption to the voluntary action of such municipalities and other local authorities."

Mr. ASHLEY pointed out that this meant that the Board of Trade was not to carry out what was obviously the intention of Parliament. There was no question, of course, as to what was the intention of the Act; and the present proposal was that the Board should say it was not going to put the Act into operation. Though the great majority of the companies, and a large number of local authorities, had come into it, and though it was clearly the intention of Parliament that the system should be general, the deputation were asking the Board to ignore this, and to leave the remaining local authorities as they were.

Alderman PHILLIPS said he did not go so far as that, but suggested that the remaining local authorities should come in . . .

Mr. ASHLEY: When you choose.

Alderman PHILLIPS: When we think the time is opportune.

THE CASE OF BIRMINGHAM.

Alderman J. H. LLOYD (Birmingham) remarked that the local authorities had the option of asking the Board to grant them an Order under the Act. On the other hand, the Act specifically stated that the Board "may," after two years from the passing of the Act, make an Order compulsorily. So that in both cases there was an option.

Mr. ASHLEY said this was not quite the case. It was well known what the word "may" in an Act of Parliament meant.

Alderman LLOYD said it did not mean "must."

Mr. ASHLEY replied that very often it did; but, whether it did or did not in this particular case, there was no question of the real intent under this Act.

Alderman LLOYD said that, from his reading of the Act, it seemed to him that the Board had the option, and it was for the Board to decide, if they thought they must enforce it, when they should do so. The Act seemed to have worked very well up till now with undertakings gradually coming under it.

Mr. ASHLEY agreed, but pointed out that the position was not a satisfactory one, when there was no uniformity throughout the country on a matter which had been held by Parliament, and at an inquiry since, to be desirable in the general interest.

Alderman LLOYD said that the conditions of the various undertakings were very different; and the evidence which was to be given by Mr. Peel, of Tyldesley-with-Shakerley, would show how exceedingly difficult it was for his undertaking, with the particular conditions applying, to come into line with others more favourably situated. It was a colliery district, and there was a tremendous leakage. With regard to the point of view of Birmingham, this agreed fairly well with the view expressed by Alderman Phillips. In Birmingham there were a large number of outside areas, just as was the case at Salford; and they were working very smoothly at present. If each of those outside areas was to have its own separate inspector, and so on, there might be trouble. Under the Birmingham Corporation's existing Act there were test places at the gas-works; and he presumed that, if the Gas Regulation Act applied, it might possibly be claimed that there should be testing places in different parts of the area, some of which were rural, some urban, and which included one or two boroughs. The Birmingham Gas Committee saw no gain whatever in adopting the Gas Regulation Act, either for their consumers or for themselves. It was recognized that Parliament had passed this Act, which was agreed to largely for the benefit of the companies, in order to improve their awkward financial position. It was also recognized that the time might come when the Board of Trade felt that they must enforce the Act; but he hoped the Board would not do so, and would in any case delay doing so as long as possible.

Mr. ASHLEY asked why it was said that the Act was introduced for the financial benefit of the gas companies. That was not its genesis at all.

Alderman LLOYD said they all knew that it was agreed to by the gas industry because it was such a tremendous advantage to the companies, who were terribly hit by the war.

Mr. ASHLEY asked whether the adoption of the thermal system was an advantage to the companies.

Alderman LLOYD said this was only a technicality.

Mr. ASHLEY held that it was not, but that it was the origin of the whole thing.

Alderman LLOYD said they all admitted that, during the war, there were great irregularities in the calorific value of gas supplied. They all knew the difficulty of getting coal, and what the gas companies had been able to do for the Government in all sorts of ways to help them to carry on the war. The consumers, owing to the variation of pressure and of calorific value, had very great trouble all round, with cookers and everything else. But this was not the normal state of affairs; and all undertakings, under the Gas Regulation Act or not, were working to maintain the pressure and calorific value.

Mr. A. W. SMITH (General Manager and Secretary, Birmingham) remarked that security to the consumer was afforded by the testing provisions, and not so much by the therm system itself.

Mr. ASHLEY suggested the two were interdependent. It was advanced that the whole technical side of the Act was due to a desire to help the gas companies. This was not so.

Mr. SMITH believed the position was really that many of the local authority undertakers realized what these new restrictions would mean to them; but because of the financial difficulties of the companies, the local authorities adopted a policy of self-sacrificing silence, and did not put in the earnest protest they were inclined to put in, in order that the companies might get the financial help they needed. The local authorities would have fought this fight at the time the Bill was introduced, but the financial position of the companies was so very bad that they were desirous of helping them. The local authorities were certainly getting no advantage, and the consumers, he believed, got no advantage, by coming under the Act.

Mr. H. C. HONEY asked whether it was not the real point that the Act attempted to protect the consumers by imposing unnecessarily stringent conditions upon the undertakers. He pointed out that Alderman Phillips had raised no objecion to the therm system.

Mr. SMITH agreed, except that Alderman Phillips did not want the introduction of the system to be coincident with a rise in price of gas, which would probably cause the same trouble in his locality as there had been in London.

Mr. HONEY remarked that he had always pointed out the advisability of making the change-over to the therm system coincident with a reduction in the price of gas, if possible. The real objection, he understood, was not to the therm system, but to the additional protection afforded to consumers under the Gas Regulation Act, on the ground that, in order to give that protection, the undertakings would have financial burdens placed upon them.

Mr. SMITH, although he could not speak for every undertaking, claimed that the consumers already had that protection without the restrictions imposed by the Gas Regulation Act upon undertakers. The gas undertakings did not develop on restrictive legislation, but wanted freedom if possible. He did not disagree at all with the question of pressure as dealt with by the Act, except that undertakings fell foul of the provisions that they must test pressure in consumers' pipes. It need not necessarily be a pipe belonging to the undertakers. He believed that the deputation representing the gas companies, when the Bill was introduced, had endeavoured to have words inserted to the effect that the pipe should be the pipe of the undertaker; and it was still felt strongly that the present provision was an injustice. His other criticism of the Act was the question as to what outside authorities might do. Possibly there was more friction and more jealousy between one local authority and another than there would be between a company and a local authority, and in the past the Birmingham Gas Department had suffered considerably from that friction. The outside authorities had opposed Bills and had done everything in their power to attack the Department. For some years now, however, the Department had lived happily with those outside authorities. If the latter were suddenly given power to appoint their own inspectors, he did not say that they would do it, but they might.

Mr. ASHLEY pointed out that under the Act a gas examiner "may" be appointed to act on behalf of any number of local authorities.

Alderman LLOYD said they "may" appoint an examiner for a particular purpose, but asked what would happen supposing they did not.

Mr. HONEY remarked that the Gas Referees had spent a great deal of time trying to arrange combinations of local authorities with regard to testing, so as to make it less burdensome not only to the undertakers, but also to the testing authority.

Mr. SMITH realized that, as the therm system had been adopted in the gas industry, sooner or later those still outside the Act would have to adopt it; but they hoped that the Board of Trade would give them as much grace as possible.

Mr. ASHLEY pointed out that they had already had 4½ years.

IS LEEDS DIFFERENT FROM BIRMINGHAM?

Mr. HONEY asked if anybody knew the result of the adoption of the therm system in (say) Leeds, and whether it had given rise to any of these terrible difficulties there.

Mr. SMITH said that Leeds was in a different position with regard to pressure as compared with Birmingham. In Leeds they were in a valley, so that they had good pressures everywhere. In Birmingham, however, owing to the housing developments on the outskirts of the area of supply, they would have to spend a lot of money in supplying under the conditions imposed by the Act. They were engaged at present in laying larger mains, putting-in boosters, and so on, to give an efficient supply. It represented an enormous expenditure, and, though they had always worked to that ideal, the growth in the outlying rural areas was so great that it was difficult to keep pace with it.

Mr. HONEY gathered that the practical difficulty was in regard to pressure. There was a provision in the Act under which certain latitude could be given. It had been given in a number of instances where a case had been made out.

Mr. W. W. WOODWARD (Salford) believed it was only for a limited time.

Mr. HONEY agreed, but said that every technical man in the industry would admit that a 2-in. pressure in a 2-in. pipe was not an unreasonable demand.

Mr. F. PEEL (Tyldesley-with-Shakerley) said it depended on local circumstances. Speaking on behalf of the smaller undertakings, and particularly the smaller undertakings in the mining districts, he did not think the representatives of some of the large towns, and perhaps the Board of Trade also, realized the serious difficulties in which those smaller undertakings would be placed under the Act. The chief objection was the minimum pressure clause. The unaccounted-for gas was serious enough, even when the area was supplied at such pressures throughout the day as just ensured a satisfactory service. The maintenance of 2 in. of pressure during the night would undoubtedly increase the unaccounted-for gas. At present it was 20 p.ct. of the output, though it had been over 30 p.ct.; and if a pressure of 2 in. were maintained throughout the 24 hours, it would be probably 40 or 50 p.ct., at a rough guess. In their area they were subject to a great deal of subsidence. The risks of explosion and asphyxiation would be considerably increased if a 2-in. pressure were maintained in the low-lying parts of the district. In the higher portions of the district the pressure would then be 5 or 6 in. The expenditure which would be required to lay a new high-pressure main and put in boosting apparatus to supply the lower portion of the district so as to get 2-in. of pressure throughout the whole area would be anything from £1000 to £2000. What return would the undertaking get for that expenditure?

Mr. ASHLEY agreed that, where there were exceptional topographical conditions, the Board of Trade could say that, having regard to the exceptional conditions, they would not impose such an Order. But many undertakings which had not adopted the new basis could not put forward any argument of this kind. Referring to Alderman Phillips' remarks as to Salford's contribution to the Gas Fund, he said he was sure Alderman Phillips would be glad to know that, if Salford had to contribute, the amount would be about £100 per annum.

Alderman PHILLIPS said that the maximum was 3s. per million c.ft. sold.

Mr. ASHLEY replied that the present contribution was 1s. 3d. per million. If Salford came in, of course, it would be reduced still further.

TREPIDATION AT STAFFORD.

Mr. T. H. POULSON (Stafford) said that the objection which his undertaking had to the adoption of the therm system was that the consumers would feel very suspicious. They were all readers of the "Daily Mail."

Mr. ASHLEY pointed out that it was one thing for local authority undertakers to say definitely that they wanted to be left out of the Act, and another to say that they would come along as soon as their particular difficulty was disposed of.

Mr. POULSON maintained that the consumers would feel suspicious if the Act were adopted. At the present time there was every possibility of gas charges being increased; and the knowledge that the electrical industry was being subsidized to the extent of £50,000,000 would appeal to the consumers as a good opportunity for changing-over from gas to electricity.

Mr. HONEY gathered that the difficulty with regard to pressure was not felt at Stafford.

Mr. POULSON said it was not. The ground was very good, and there was no subsidence.

Mr. HONEY said that neither was there in Birmingham or in Salford.

Alderman LLOYD said it would be almost impossible to fulfil the provisions of the Act in every case.

Mr. HONEY said it raised the point as to whether the undertakers were justified in taking on new consumers if they could only do so by giving the existing consumers a very unsatisfactory supply.

Mr. ASHLEY said that, as he understood the position, 75 p.ct. of the local authorities (based on production in England in 1923) had

adopted the new basis, and 25 p.ct. had not. He asked why the 75 p.ct. had found it possible to do so. [Mr. Honey has since informed us that as a result of a hasty calculation Mr. Ashley was led to state that the percentage of gas supplied by local authorities in England and Wales which have not yet adopted the therm system is only 25 p.ct. of the total quantity supplied by all local authorities in England and Wales. The approximately correct figure is 56½ p.ct.]

Mr. HONEY asked if anyone knew of a substantial undertaking which had adopted the Act, had given it a fair trial, and would like to get rid of it.

Mr. POULSON said that, though he would not commit himself, he believed that if the Leicester Corporation had known that they would have to spend nearly £15,000 on new mains, they would have hesitated before applying for their Order.

BRENTFORD GAS COMPANY.

Annual General Meeting.

The Yearly Ordinary General Meeting of the Company was held last Wednesday afternoon, at Caxton Hall, Westminster—Mr. R. J. NEVILLE NEVILLE, M.P., in the chair.

The SECRETARY (Mr. H. L. Mann) having read the notice convening the meeting, and the resolutions of the last ordinary meeting, the report of the Directors and statement of accounts for the year ended Dec. 31 last were taken as read.

HARROW AND RICHMOND AMALGAMATIONS.

The CHAIRMAN: Ladies and Gentlemen,—Before dealing with the accounts in detail, it will perhaps be desirable to refer to several important events affecting the Company which have occurred during the past year. The most important of these is to be considered at the extraordinary meeting which is to follow this one, and I will, therefore, not refer to that further at this stage. The amalgamation with the Harrow and Richmond Companies is now an accomplished fact. When I last addressed you, a year ago, the result of the Company's application to the Board of Trade for the Order authorizing this amalgamation was not known, but the Order was finally made on March 7, 1924. By this Order, the date of transfer was made Jan. 1, 1924, so that the amalgamation was retrospective for about three months. This introduced several complications of an administrative nature, but, notwithstanding, the transfer was carried out smoothly and successfully. The difficulties of the transfer were much lightened by the loyal assistance of the staffs of the two Companies taken over. The year's working is, of course, complicated by this addition to our undertaking, and it is too early to see the full effect of the amalgamation; but the Directors are well satisfied with the results so far obtained.

APPLICATION FOR STANDARD PRICE REVISION.

In November last the London County Council applied to the Board of Trade for a revision of the Company's standard price under the Gas Regulation Act. Prices have fallen considerably since the new standard price was granted early in 1921, the price then granted being 17·8d. per therm; and there was no dispute that a downward revision had become due. A public inquiry was held by the Board of Trade on Feb. 2 of this year. No trouble was spared in presenting the Company's case to the Tribunal; but as the decision of the Board of Trade has not yet been announced, the Directors are unable to offer any opinion as to the new standard price that will be fixed.

WEMBLEY.

During the year the British Empire Exhibition was opened at Wembley, and proved a very great attraction. A joint exhibit showing the various uses of gas was provided by the gas industry, and was visited by many thousands of people. I dare say you all remember that the Seven Ages of Woman were excellently displayed. Wembley is within our limits of supply, since the amalgamation with the Harrow Company; and the responsibility of providing the very large quantity of gas used at the exhibition fell upon us. Gas was used for lighting, for cooking in the numerous restaurants, for heating, and for various other purposes; and the total quantity supplied to the Exhibition amounted to no less than 81,380,000 c.ft (equivalent to 406,900 therms). It is interesting to know that the total amount of electricity supplied to the Exhibition was 8,750,000 units (which is equivalent to 301,000 therms). The total energy supplied in the form of gas was, therefore, 30 p.ct. more than that supplied by electricity, which is a significant and satisfactory fact.

SATISFACTORY ACCOUNTS.

Turning now to the accounts in detail, I should point out that the comparisons with the previous year given on the accounts before you are, in each case, with the total of the three separate Companies for 1923. On the whole the accounts are satisfactory. The increase in the therms sold is 11·67 p.ct.; but a considerable proportion of this increase was directly due to the exhibition at Wembley. Apart from the gas consumed at the exhibition itself, there is no doubt that an increased population was brought into our area of supply during the period of the exhibition; and as these additions are probably of a temporary nature, the rate of increase for the year cannot be looked upon as entirely normal. Even making every allowance for the special circumstances of the year, it is quite evident that there is still plenty of life in the gas industry. Despite the increase in the gas sold, the gross profit was less by £38,000 as compared with the profit earned by the three Companies last year. This is chiefly due to the lower price charged for gas. The price of gas during the year was 0·7d. per therm (equivalent to 3½d. per 1000 c.ft) below the average price of gas in the Brentford district during 1923, and slightly more than this below the average price charged by the three undertakings in 1923. The amount carried forward in the profit and loss account is slightly smaller at £154,658. Referring now to the capital account, it will be seen that £33,000 was spent on land. This is accounted for chiefly by the acquisition of the premises which adjoin our Brentford Works. This site possesses convenient river and road frontages, and will facilitate the rearrangement and extension of our plant. The amount spent on buildings, plant, and machinery is comparatively small this year. The expenditure on these items has been heavy in recent years, and further large extensions would be essential in the immediate future. Practically £100,000 has been spent on new mains and services, which is more than double last year's figure. With the building and development that are taking place in different parts of the Company's district, a very heavy expenditure on mains and services is necessary. The cost of new meters and stoves is £117,000, and this large expenditure is due to the increases in the number of cooking and heating stoves which are being installed and to the growth of the district. On the other side of the capital account it will be observed that £6650 of 7 p.ct. mortgages were repaid during the year.

COAL, OIL, AND RESIDUALS.

As regards the revenue account, coal and oil cost about one-third of a penny per therm less than in 1923. The total cost of coal and oil was 5·92d. per therm, as against 6·27d. in 1923. This advantage was, however, more than offset by the reduced yield from residuals, which produced nearly a halfpenny per therm less than the previous year. This is a very important matter to us; and, unfortunately, looking at the state of affairs at the present time, it seems very likely indeed that the price of gas in the coming year will have to go up, in consequence of the reduction in the value of our residuals. I do not say that it is bound to do so, but it is quite "on the cards." Now, this falling-off of nearly a halfpenny per therm in the receipts from residuals was due to a small extent to a reduction in the revenue from breeze and sulphate of ammonia, but chiefly to the very serious fall in the price of tar. The receipts from tar are down by £35,000; but, owing to the increase in output, this does not give a fair measure of the fall. The average price per gallon received for tar during 1924 was practically only half the corresponding price in 1923. These losses were to some extent offset in 1924 by the satisfactory yield from coke, which showed a net increase of 3s. 2d. per ton. It is not, however, anticipated that the existing price of coke can be maintained during the present year; and as tar prices still remain very low, the condition of the residuals market gives rise to anxiety. It is considered that the loss here may more than neutralize any advantage the Company may be able to obtain from a reduction in the price of coal. The cost of repairs and maintenance of works and plant is not greatly different from 1923, when allowances were made for the increased output of gas. In fact, the cost per therm sold is nearly identical. The expense under this head would have been considerably greater if certain works of reconstruction had not been held in abeyance pending the arrangements which are to be referred to at the extraordinary meeting. The distribution charges show a small decrease, due chiefly to a reduction in the item for repairs of mains, &c. The work carried out during 1924 on mains has been mostly of a capital nature; and the reduction is only temporary, in view of the large replacements to be carried out. It will be noticed that £20,000 has been charged to revenue in 1924 on account of the amalgamation with the Harrow and Richmond Companies, and a further charge in this respect will have to be made in 1925. As against this, no allocation has been made this year to the special purposes fund. With regard to the sale of gas, it will be noticed that, despite the lower price charged, the money received has increased by over £40,000. The receipts from meter and stove rentals have also increased. Turning now to the profit and loss account, the interest on debenture stock and mortgages has increased by £11,000, this being due to the conversion of the old Richmond ordinary stock into redeemable debenture stock in accordance with the terms of the amalgamation. As against this, a small amount of our 7 p.ct. mortgages were repaid during the year. No fresh capital has been raised, for reasons which are obvious; but the bank overdraft is considerably increased. This is reflected in an increase of £7000 odd in the interest on the overdraft and sundries. That, I think, deals with the chief items requiring comment in the accounts. The rates of wages were raised as from Jan. 1 of this year under the sliding-scale agreement in force, and this increase will cost the Company something more than £10,000 per annum. Unfortunately, the future of the wages question is uncertain. Notice has been given by the Unions to terminate the existing agreement shortly, and at present matters are at a deadlock. The negotiations are in the able hands of Mr. Milne Watson, and I am sure you will agree that, if a satisfactory agreement can be arrived at, he is the man to do it.

RELATION OF OUTPUT TO CAPITAL

I take this opportunity of referring to another question which is becoming of growing importance. The relation between increased output of gas and the capital expenditure necessary on works and distribution plant to meet this increase is now very different from what it was before the war. The level of prices is to-day nearly 100 p.ct. above the pre-war level, and it appears unlikely to change very greatly over a period of years. Until recently the larger proportion of the capital of most gas companies was "pre-war capital," raised to carry out work at pre-war costs, and obtained at pre-war rates of interest. As the demand for gas grows, and extensions are carried out, a gradually increasing proportion of capital is "post-war," raised at increased rates of interest to carry out work at doubled costs. Companies who are fortunate enough to possess a

surplus of manufacturing plant are in a stronger position. So, in some respects, are those serving a built-up area, who can avoid costly extensions to mains and get increases of output, up to a point, by intensification. Suburban and rural areas with new communities growing up at different places present an entirely different proposition. A very large expenditure on distribution works is necessary; and the cost of this work is further increased by the new road surfaces now in use, which have enormously added to the expense of main laying. Furthermore, in the new housing schemes, houses are built much farther apart than previously. While no doubt this is advantageous from the point of view of health, it adds very much to the length of main and service pipe per house, and reduces the possible consumption per mile of main. Companies such as Brentford are particularly affected by these changes, and it will be extremely difficult for them to break new ground and obtain the fresh business necessary to keep gas in its rightful position among suppliers of heat and power, without raising the capital expenditure per therm above what it is at present. This will necessitate a wider margin between manufacturing costs and selling price than in the past, and should be taken into account when new standard prices are arranged. If the legislation regulating the gas industry is not sufficiently elastic to give undertakings a proper allowance for this increasing cost, the result must be to check development—to the disadvantage of the community as a whole. In conclusion, I wish to record my conviction that gas is the best form in which coal and oil can be employed in providing heat and power, and to say that my faith in the prosperous future of the industry is unabated. Competition—rate-aided, and perhaps even State-aided—will become keener as time goes on, and it is more than ever incumbent on the industry to put efficiency in the forefront. Whenever an opportunity can be seen of taking any steps which lead to economy of manufacture and a lower selling price, I feel that it is our duty to put any personal feelings and prepossessions on one side—in the conviction that giving a cheap and efficient service to the community is the only sound foundation upon which the contentment of the employees and the prosperity of the shareholders can be built. I have now much pleasure in moving:

"That the Directors' report and statement of accounts as published for the year ended Dec. 31. 1924, be received, adopted, and entered on the minutes."

Sir ROBERT SHAFTO ADAIR, Bart., seconded the resolution.

The CHAIRMAN, replying to questions asked by shareholders, said the item in the revenue account "Brentford Gas Order" included all the compensation which the Company had to give to the various people entitled to it under the Order. As to how far synthetic ammonia was going to affect the Company, this was a technical question to which he did not feel qualified to give a definite answer. No doubt it would affect them, but whether it would do so to a serious extent he could not say. They had to take the risk of all competition. A lady shareholder who had complained of the pressure at dinner time on Sunday had selected the hour of biggest load to refer to. The maximum consumption of gas took place on the hottest Sunday in the summer at the cooking hour. There was at least 40 p.ct. more consumption during that hour than in any other hour of the day. Everything possible was done to maintain the pressure, but the difficulty would be understood.

The resolution was then carried unanimously.

THE DIVIDEND.

On the proposition of the CHAIRMAN, seconded by Sir ROBERT SHAFTO ADAIR, it was agreed:

"That final dividends for the year ended Dec. 31, 1924, subject to income-tax, be declared—viz., at the rate of 5 p.ct. per annum on the 5 p.ct. preference stock; at the rate of £6 2s. p.ct. per annum on the "A" consolidated stock; and at the rate of £6 2s. 6d. p.ct. per annum on the "B" consolidated stock; and that such dividends be payable on March 2."

RE-ELECTIONS.

The CHAIRMAN, proposing the re-election as Directors of Mr. D. Milne Watson and Mr. William Mann, said he did not think it was necessary for him to make any remarks about these two gentlemen. Mr. Milne Watson, as they knew, was at the present time the person to whom the gas industry owed more probably than to anyone else. He had done more work for the industry in arranging the wages question and solving other difficulties than most people were aware of. Nothing could give greater strength to their Board than to have the Governor of the Gas Light and Coke Company as a member of it. As to Mr. William Mann, there was no one living to-day who knew so much about the affairs of the Company as he did.

Sir ROBERT SHAFTO ADAIR seconded the motion, which was agreed to.

Thereafter the Auditors (Messrs. Monier F. Monier-Williams and Alfred Bevis) were reappointed, on the proposition of Mr. FORRESTER CLAYTON, seconded by Dr. RODMAN.

EXTRAORDINARY MEETING.

The CHAIRMAN: That concludes the business of the ordinary meeting, and I call upon the Secretary to read the notice convening an extraordinary meeting to consider the Bill deposited by the Gas Light and Coke Company for the transfer to that Company of the undertaking of the Brentford Gas Company, and for other purposes.

The SECRETARY read the notice convening the meeting, and the heads of the Bill.

The CHAIRMAN: Ladies and Gentlemen,—You have just had read to you the heads of the Bill which is being laid before Parliament by the Gas Light and Coke Company, and I think you will require some explanation from me as to the position in which we are. The only portion which is of immediate concern to this meeting is the section dealing with the acquisition of the Brentford Gas Company, and the terms upon which that acquisition would take place are, as you know, subject to approval by Parliament. Of course, everything I am saying here is subject to the sanction of the Committees before whom the Bill will come. As you are aware, the sentimental connection between this Company and the Gas Light and Coke Company has been of long duration, and in many ways the two undertakings have followed a parallel course.

PROPOSED AMALGAMATION WITH THE GAS LIGHT AND COKE COMPANY.

It was only after the gravest and most careful consideration, however, that the Board decided that a binding amalgamation of the two undertakings was desirable in the interests of shareholders and consumers alike. The great disadvantage under which this Company labours as compared with the Metropolitan Companies which are its neighbours is due to a cause that good management cannot remove—its geographical position. This disadvantage, which was not so noticeable in the past, when most of the gas was made at Brentford and supplied to the eastern side of the district, became more marked as time went on; and as business expands—and expand it must—the difficulty becomes greater and greater. The Company have only one riverside station—the old Brentford Works. They are distant from the sea, and 25 miles barging of coal is entailed. The site is long and narrow, and very inconvenient and congested. The principal manufacturing station is at Southall, on the verge of our district, access to which is both difficult and costly. The access by water is through a canal, which has eleven locks between the Thames and our works; and at each of these locks every ton of coal going up or coke coming down has to pay for the use of the lock. Thus there is a considerable increase in cost as between the two stations. In addition to the site at Southall, we have three other small stations, at which raw material is dearer still. Our cheapest station—Brentford—is fully occupied at the present time; and although its capacity can be increased by a drastic and expensive reconstruction, the proportion of gas made there as compared with the rapidly growing total output must tend to diminish as time goes on. The geographical position of the various works not only adds greatly to the cost of coal and oil, but has an adverse effect on the price of residuals, the great bulk of which are produced and dealt with at Southall. As I have already said, this station is on the verge of our district, in practically open country, and is the station at which the needs of the future must be mainly provided for. The residuals produced from dear coal must be brought back at varying degrees of expense to the populous districts, and there compete with residuals from down-river works fed from cheaper sources. These factors, which are clearly beyond the control of the Board, must, of necessity, put us at a disadvantage as compared with more favoured undertakings; and, as far as we can see, there is little or no hope of improvement. The cost of transport is more or less a fixed factor; and the lower the cost of material becomes, the greater the proportion it bears to the whole, and the greater the proportionate burden to be borne by this Company in comparison with others. To give an instance, supposing the overhead price of coal is 20s. per ton, and the freight 5s., we have to pay 25 p.ct. for transport. If coal is 15s. per ton, and we pay 5s. for freight, the transport charge is 33 p.ct. Thus the lower the price of material, the greater is the proportion for transport charges. Even before the outbreak of war the Directors realized that these disadvantages, although they had not at that time assumed their present proportions, would become increasingly important as time went on: and a very strong effort was made in 1914 to secure manufacturing powers for a riverside site at Chiswick. The attempt, however, was unsuccessful, and the war immediately followed. Nothing could, of course, be done during the years of the war; but directly after the armistice the question of works at Chiswick was again brought before Parliament. The proposal, however, had to be withdrawn in face of the strong opposition aroused, and it was realized that the state of public opinion rendered it impossible for a suitable river site to be obtained on the Company's district. I think I may say that if we had acquired that site at Chiswick it is very probable that there would have been no question of amalgamation. The whole matter turns on the fact that we cannot get riverside accommodation so as to reduce the cost of our raw materials. It having thus been found impossible to acquire any more favourable site, the only alternative before the Company was to extend at the existing works at Southall. As I have explained, this would perpetuate the disadvantages under which we labour—and, in fact, increase them. The output capacity of the Brentford site is strictly limited, as those of the shareholders who are acquainted with it will realize, and development would, therefore, of necessity be chiefly at the other stations. Apart from the comparatively high cost of manufacture at these stations, owing to their geographical position, the question of capital expenditure had to be very seriously considered. At the present level of prices (which seems likely to remain substantially unchanged for a long period), the cost of new plant is a heavy burden; and as successive increases of output had to be met by extensions to the works, the position would become progressively worse.

ADVANTAGES OF AMALGAMATION.

As against this, the Gas Light and Coke Company, with their surplus of manufacturing plant, can meet a substantial part of these increases without much capital expenditure. It is certain that the gas required for the future needs of this area can be manufactured more cheaply at the more favourably placed stations of the Gas Light and Coke Company, to the advantage of all concerned. Another consideration that weighed heavily with your Directors was the immediate need for heavy capital expenditure on new mains, meters, stoves, &c., to meet the somewhat scattered growth of the district. During 1924 we have spent £266,000 on capital account, and, as far as can be seen, this rate of expenditure must be maintained, if not exceeded, for at least five years. This is a large sum of money, and a great deal of it cannot become immediately productive. The result would be, of course, an increase of capital per unit produced, with a corresponding increase in the expenses to be borne by the Company and charged in the price of gas. It is true that the whole of the capital expenditure would not be avoided by amalgamation; but it would be spread over a much larger output, and

the effect on the financial position would be very small. The output by the Gas Light and Coke Company in 1924 was six times that of this Company, and it is obvious that a large sum for the smaller Company would be much less serious to the combined undertaking. The districts of the two companies run side by side for many miles. By joining-up the two systems, which can be easily done, economies in expenditure can be made, and a more equal distribution of gas effected. At the present time the heaviest consumption of gas is at the eastern side of the Brentford district, far from the manufacturing stations. This eastern area is difficult to supply for this reason; and with the growth of the demand for gas *en route*, the supply mains are already heavily loaded. Linking-up with the Gas Light and Coke Company will be of great assistance in this matter, and will ease the whole distribution problem. In addition to capital expenditure, we had in hand an extensive scheme of reconstruction which, while increasing the efficiency of the plant, would prove a burden for some years to come. Taken altogether, the advantages of amalgamation seem to the Board to be such as to leave them no alternative to acceptance. The terms of amalgamation agreed upon have been fully stated in the epitome of the Bill which you have heard from the Secretary. The Board consider them fair and equitable in view of the relative prospects of the two Companies for some time to come, and strongly recommend them for your acceptance. Since the terms became known, the Brentford stocks have shown a substantial rise in value, and that, of itself, is a concrete indication of the opinion formed by the investing public. The shareholders thus gain a considerable appreciation in the capital value of their holdings, together with an increase in dividends. No one will regret more than your Directors the loss of our identity. The Brentford Company has been in existence for over 100 years, and (if I may be permitted a personal reference) I have had the honour of serving on your Board for more than 30 years. However, we shall be merging our interests in the largest, and, perhaps, most famous gas undertaking in the world, and sharing in the wider activities of this great Company. I beg leave to move:

"That the provisions of the Bill now before Parliament intituled 'A Bill to provide for the transfer to the Gas Light and Coke Company of the undertaking of the Brentford Gas Company; to confer various powers upon the Gas Light and Coke Company; and for other purposes,' be and the same is hereby approved, subject to such alterations as may be made in the Bill by Parliament and approved of by the Directors of this Company."

Sir ROBERT SHAFTO ADAIR seconded the resolution.

A short discussion ensued; the points raised being dealt with by the CHAIRMAN and by Mr. BROWN (of Messrs. Dyson, Bell, & Co., Parliamentary Agents). The former pointed out that the amalgamation would be of great advantage to the consumers, who were going to gain in a very much larger proportion even than the shareholders.

The resolution was carried unanimously.

Dr. RODMAN proposed a hearty vote of thanks to the Chairman, who had given them a very lucid explanation of the objects of the Bill. The proprietors should express their indebtedness to him and to the other members of the Board for all the work they had done during the past year.

The vote having been heartily accorded,

The CHAIRMAN, in his acknowledgment, pointed out that they owed a great deal to their staff, who had served them so extraordinarily well, not only in the past year, but in preceding ones. The excellent position the Company occupied that day was largely due to the skill of the staff, and to the devotion and loyalty to the Company's interests of the employees generally; and he was sure the proprietors were grateful to them for what they had done—and especially to their splendid Engineer and General Manager, Mr. A. A. Johnston.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

Annual Meeting.

The Annual General Meeting of the Company took place last Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON (the Chairman) presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting, and the report and accounts were taken as read.

THE LATE MR. A. F. PHILLIPS.

The CHAIRMAN, on rising, said he felt it incumbent upon him, before proceeding to the more formal business of the meeting, to make some reference to the death of Mr. Arthur F. Phillips. At a date so long removed from the time of his decease, and having regard to the fact that most of those present knew him personally, he would content himself with one or two remarks. Possibly few of those even who knew him were aware of the fact that Mr. Phillips commenced his career as a military engineer. He was a Royal Engineer at first, and subsequently transferred his abilities to the civil branch of his profession. Perhaps he owed to those earlier years some of that high sense of duty and that tireless industry which enabled him to deal successfully with the work of any office he was called upon to fill.

SUBSTANTIAL INCREASE IN GAS SALES.

During 1924 there had been a substantial increase in gas sales, amounting to 6·68 p.ct. This increase, however, was not wholly attributable to an expansion of the business, because some eighteen months ago the Board had determined to deal radically with the question of pressures in connection with the distribution system, and about £30,000 had been spent in reconstituting the conditions under which gas was distributed in Brighton. It was recognized by them that this matter of pressure would always be one of paramount importance in dealing with gas supply. In part, expansion of business accounted for the greater quantity of gas sent out, because even at the present time they were still maintaining a substantial increase in their business, and there was every prospect of this state of affairs being sustained throughout the present year. The Company had received for the purposes of the undertaking capital totalling some £883,000; and, applying this to the gas sold, it only amounted to something like £437 per million c.ft.—an extraordinarily low figure, which, if it could remain unqualified by any further comment, would be even more satisfactory. But there was on capital account a balance of only £18,000, which was absolutely unequal to providing their needs in the way of working capital. Again, there was in the balance-sheet a suspense account (which, of course, was capital expenditure not carried to capital account) of £69,000, and there was a loan from bankers of £30,000. Taking all these figures together, it would be seen that they were in the position of needing more capital in order to carry on such a rapidly-expanding business. An appeal would therefore be made to the proprietors and the public generally to supply this capital, and he trusted the opportunity would not be neglected. The revenue expenditure for the past year had been about £4000 more than in 1923, and the receipts £1130 less. Though the profit was £5000 less, it was more than adequate to meet all demands upon it, and to allow of a little extra dividend as well. The net result of the operations was that, whereas they brought into account some £44,212, they took out £44,728, so that they were increasing the carry-forward by £516, and at the same time paying an increased dividend, for which the proprietors had waited many years very patiently. The Board had every reasonable hope, so far as they were masters of the situation, of maintaining this increment in the future.

CENTENARY OF THE UNDERTAKING.

This occasion possessed a special significance, because it was the centenary of the Brighton Gas Company. They had now been in existence a hundred years, and he felt constrained to say that, so far as commercial, technical, or industrial reasons were concerned, there was not the slightest reason why they should not go on for another hundred years. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion.

Mr. H. E. JONES said he would like to support the resolution. It was interesting to find that the undertaking had now reached its centenary, and he was glad to think it was still in the hands of the Paddon family. The Chairman's respected father was one of his (Mr. Jones's) earliest friends. The Company's experience with regard to expenditure on mains was quite a common one with those who had increases in the sale of gas. To-day they were obliged by the Gas Regulation Act, under penalty, to give four times the pressure they were formerly called upon to do. This had been forced upon them, and it had compelled two or three of his own companies with enormous districts to incur very great expenditure on mains. The Board were pursuing a sound policy, which would place the Company—and had placed it—in the forefront of prosperous, reliable undertakings which were a credit to the towns they supplied, and likewise a benefit to those towns by their good service. Altogether the report did the Directors great credit.

On the motion of the CHAIRMAN, seconded by Mr. P. WELLESLEY COLLEY, J.P., dividends were declared for the half-year, making, in the case of the original ordinary and "A" ordinary stocks a distribution for the year of 12 p.ct. and 9 p.ct. respectively.

The retiring Director (Mr. P. W. Colley) was re-elected, on the proposition of the CHAIRMAN, seconded by Mr. H. E. JONES; and Mr. Lewis Hardy, F.C.A., was reappointed an Auditor, on the motion of Mr. HARRIS, seconded by Dr. HAROLD G. COLMAN.

On the proposition of Mr. F. G. PILLEY, Mr. William Cash, F.C.A., was reappointed Special Auditor to audit the accounts for 1924, in conjunction with the Special Auditor appointed by the Corporation of Brighton, under the Company's Act of 1866.

Sir CHARLES L. MORGAN, C.B.E., proposed a hearty vote of thanks to the officers, staff, and employees generally, for their services during the past year. In Mr. Burton they had, he said, a Secretary second to none in the City of London; while Mr. Rutter not only possessed technical engineering qualifications which eminently suited him for the position he held, but he had a manner with him that was worth a very great deal to anyone who had charge of a staff.

Mr. FRANK H. JONES seconded the vote, which was cordially passed.

Mr. BURTON, in his acknowledgment, pointed out that this was the 58th general meeting of the Company at which he had been present. The proprietors could have no idea how deeply loved was Mr. Rutter by his staff throughout.

Mr. C. H. RUTTER (the Engineer and General Manager) also acknowledged the vote, on behalf of himself and all those engaged at Brighton. He said the results that had been submitted to them that day were largely owing to the good work of his staff, and he mentioned in particular Mr. Browne, the Distributing Engineer, and Mr. Corfield, the Manufacturing Engineer at Portslade.

The proceedings were brought to a close by a vote of thanks to the Chairman and Directors.

South Shields Gas Company.—Dividend warrants for the half-year ended Dec. 31, 1924, as follows, have been posted: On the consolidated stock, 4¼ p.ct.; on the new stock, 4¼ p.ct.; and on the ordinary stock, 2⅞ p.ct; all less income-tax.

Liverpool Gas Price Increase.—In consequence of the large decrease in the amount obtainable for tar and ammonia, the Directors of the Liverpool Gas Company have found it necessary to increase the price of gas from 7·4d. to 8d. per therm, as from the March quarter meter reading.

BOURNEMOUTH GAS AND WATER COMPANY.

Annual Meeting.

The Ordinary General Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. WILLIAM CASH, F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting, and the minutes of the last annual meeting and extraordinary meeting; and the Directors' report and statement of accounts were taken as read.

BUSINESS GROWING ALL ROUND.

The CHAIRMAN, in moving the adoption of the report and accounts, said that really the report which the Board were presenting that day might be summed-up almost in one word, and that was "growth." Progress all round was quite extraordinary; in that respect they had a wonderful district. Bournemouth possessed many advantages, climatic and otherwise. It was endowed by Nature with great charm, it was a favourite locality, and it was a well-administered town. With these advantages growth was not to be wondered at. He wanted to base what he had to say upon this state of affairs. Glancing first at the gas revenue account, he would point out that the increase in the sales of gas for the year had amounted to 9·84 p.ct., which was a very substantial figure indeed. It would, indeed, have been much larger, but for the mild weather in the latter portion of the year. For the first six months, the increase was nearly 14 p.ct.; but in the second half-year it was only 5·8 p.ct. In quantity, the total increase amounted to 160 million c.ft. Meter rentals were up by £590, and stove and fittings rentals were also up—the increase in these three items amounting to £1926. The profit on fittings was more by some £3300; and residuals, which had been in a sense rather disappointing, were up by £8500. He said residuals had been in a sense rather disappointing, because on the other side of the account it would be noted that coal and oil had cost more by £15,400. The net price of coal (less residuals) was almost identical with a year ago, though the price of coal was lower by about 6d. per ton. The total expenditure was £32,439 more. He did not propose to go through the figures in great detail, but would remark that there had been a large increase in the cost of repair and maintenance of stoves and fittings, due to the definite policy of the Board to spend a big sum in overhauling the stoves out on hire. The total receipts for gas and water combined were over £500,000. The price of gas had been 8·6d. per therm, or 3s. 2¾d. per 1000 c.ft., which was a very low figure indeed. During part of 1923 the price was 9d. per therm; and if in 1924 the price had been relatively the same as the year before, the receipts would have been £3900 more than was actually the case.

THE WATER DEPARTMENT.

From the water accounts it would be seen that the rental had gone up about £2000; and he might say, incidentally, that during the year the charge for water in Wimborne had been reduced to the same figure as in Bournemouth, which concession had cost the Company £450. They had been helped by the wet season, inasmuch as the quantity of water pumped had been only 14 million gallons more than in 1923. They would notice an increase in the item of filtration and water softening. Rather more had been done in the way of treatment of the water, to which matter great care and attention were given; and this had cost an extra £1000.

NET REVENUE AND CAPITAL ACCOUNTS.

Turning now to the net revenue account, the profits on both departments, gas and water, were nearly £3000 more than a year ago. On the other hand, they were meeting a much heavier charge for dividend, the additional amount under this head being about £7600. Towards this, in addition to the extra revenue, they had this year a credit on income-tax account. It would be seen that heavy capital expenditure had been incurred in connection with the gas undertaking. There were a few minor outlays, including £8250 for a new gasholder at Christchurch, but the bulk of the large item of £133,364 had been spent on the new gas-works at Pitwines, Poole. On the water undertaking the capital expenditure had been comparatively small, but the balance for Alderney reservoir cost £1600, and the rest was for the boiler house and turbines at Langham. He invited the attention of the proprietors to the item of new mains, both gas and water. In connection with this, there would be noticed in the balance-sheet an item which was not new, but which was growing—"Contributions towards cost of mains contingently repayable." The Company had an arrangement which worked extremely well, and was eminently fair, and under which estate owners made a contribution towards the cost of laying mains that were not immediately remunerative. The money remained in the Company's hands, and as houses were built and connections were made a proportion of the expenditure was returnable to the estate owner. During the year they had laid over 20 miles of distribution mains for both gas and water, and the cost had been some £17,000. Cookers and fires had been sold to the number of 5162, and the total showroom sales during the year came to over £48,000. He was quoting these figures still on the same theme of growth. In 1924 there had been 1196 houses finished in the district, and of these 593 were piped only for gas, and 603 were piped for gas and wired for electricity. Thus the Company were holding their own in this respect. A further 260 houses were in hand at the end of the year. The number of points put into these houses for cookers, fires, lights, and water heating was over 9000, so that the distribution department had been very busy. So far as competition with electricity was concerned, there was certainly room for both, and the Company did not in the least fear fair competition. The gas industry was not asking for subsidies; but they felt that gas was doing its duty in providing the best form of fuel and contributing most of the purity of the atmosphere—thus adding, if possible, to the advantages of Bournemouth in this respect.

NEW SHOWROOMS AND OFFICES.

Steps were being taken to provide new showrooms and central offices in Christchurch Road, for at the present time they were very cramped. In some respects they regretted having to make a change, but he thought the proprietors would agree that they were doing the right thing in putting their offices and showrooms together in the centre of the town. It was also their intention to provide showrooms at New Milton, in the Christchurch district, where their business was expanding very rapidly. This concluded his review of the work during 1924.

THE PRICE OF GAS.

It was stated in the report that, in order to meet increased capital charges, additional labour costs, and the fall in the price of residuals, it would shortly be necessary to raise the price of gas from the extremely low figure at which it had stood since Lady Day, 1923. A year ago he had told them what had been the Company's policy. They were then commencing to embark upon this heavy new capital expenditure. They had been working under very favourable circumstances, with the existing plant taxed to its utmost. In the year under review they had not actually earned their dividend, and the carry forward was down. This was, however, due to the deliberate policy of reducing the price of gas to the lowest possible figure and drawing upon the carry forward, which had got up to a very substantial figure. This synchronized with the position to-day, when the outlook for residuals was not very bright. They had concluded new contracts for coal at some decrease in cost, but they would not get the advantage of this until June next. Indeed, with tar and sulphate of ammonia both on the down grade, he did not think there would be any net advantage. Another thing was that they had to meet an increase in wages from Jan. 1. The wages were based upon a sliding-scale which rested on the cost-of-living figures published by the Board of Trade. They would have seen from the newspapers that the leaders on the men's side had asked as long ago as June last for an all-round increase of 12s. per man per week, time-and-a-quarter for night work, and a fortnight's holiday per annum with full pay. The employers were not proposing any decrease in wages, but they were not prepared to grant these demands, and offered arbitration, subject to the one condition that the sliding-scale, which in their view was not perfectly fair as it existed at the present time, should also be submitted to the Arbitrator. This offer had been refused. The Company's relationship with their own men, as he had often said, was very good indeed; their employees were thoroughly well treated. Comparatively recently, during certain alterations in the wages, they slightly increased their basic rate. They had a co-partnership scheme, a pension fund, and other like advantages. The percentage increase in actual wages paid to-day over pre-war varied from (say) 80 p.ct. to practically 100 p.ct. for different employees, the cost of living standing to-day at 80 p.ct. over pre-war. He hoped, therefore, the proprietors would agree that it was not unreasonable to say they were not in a position to-dav to further increase wages, with circumstances as they were. Looking at the other parties concerned, the investor had not had any such increase. The bulk of the Company's capital bore a fixed rate of dividend; while as for the sliding-scale dividend, they were only distributing £500 per annum more than pre-war, relating to their whole capital of £1,250,000. Therefore anything to which they agreed in the nature of increased wages must fall upon the consumers, and the Board did not think they were justified in putting this burden upon them. If the matter went to arbitration, and it was decided otherwise, of course they would be bound by the decision. They trusted their employees would understand the position, and that the good relationship which had existed so long would continue.

The DEPUTY-CHAIRMAN (Sir Charles L. Morgan, C.B.E.) formally seconded the resolution for the adoption of the report and accounts, and it was carried without discussion.

THE DIVIDEND AND RE-ELECTIONS.

On the proposition of the CHAIRMAN, seconded by Sir CHARLES J. JESSEL, Bart., it was resolved that the interim dividends to June 30 at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 8½ p.ct. on the original shares, be confirmed; and that dividends for the second half-year be declared at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 8½ p.ct. on the original shares. The Chairman pointed out that these were the same rates as were paid a year ago.

The CHAIRMAN, proposing the re-election as a Director of Lieut.-Col. Harold W. Woodall, C.I.E., said that his name was so well known to the proprietors (he having been their Engineer for many years) that it was unnecessary to say much about him. His experience was a very wide one, and he was a most valuable Director.

Mr. E. HONORATUS LLOYD, K.C., seconded the motion, which was agreed to, and acknowledged by Lieut.-Col. WOODALL.

On the motion of Mr. WHITTAKER, seconded by Dr. RODMAN, the retiring Auditor (Mr. R. H. Glen, F.C.A.) was re-appointed.

A VOTE OF THANKS.

The CHAIRMAN next proposed a very hearty vote of thanks to the officers, staff, and employees generally, for their work during the past year. He remarked that it had been a very onerous year, especially to Mr. Moon, who had had a big job in the erection of their new works at Pitwines. These works had advanced very materially during the past twelve months. They were not at the end of the expenditure on them yet, but hoped they would be completed in the current year, and available for next winter. The whole scheme had been carried out with conspicuous ability, and he believed the Company would be proud of the works when finished. The staff under Mr. Moon had also done exceedingly well. With such responsible work to do, they ought to have good officers, and they had got them. The men, too, had worked well and loyally during the year.

Dr. RODMAN seconded the vote, which was heartily accorded.

Mr. PHILIP G. G. MOON (the Engineer and General Manager), on behalf of himself and the staff and employees at Bournemouth, thanked the proprietors sincerely for the approval that had been expressed of what they had tried to do during the past year. It was quite true that, as the Chairman had said, it had been a very busy

year, but it had been none the less happy on this account. Further, he was glad to say, it had not differed in this respect from most of the years that had preceded it. Bournemouth was continually growing, and they were always beating their own records, and looking forward to doing so again. The success with which they had got through their work was entirely due to the loyal manner in which the staff and workmen at Poole had co-operated. They were a very happy family. They felt that the Directors, staff, and men were in sympathy with one another. They trusted one another, and this spirit of trust and sympathy did lead to that true co-operation which spelt real efficiency. They were all very proud of the Company. He thought, too, that the other very necessary party to any real co-operative progress—the consumer—realized that those employed by the Company had learned that their success would be measured by the quality of the service they gave him. He was confident that they had a wonderful future before them in Bournemouth. The development there was remarkable.

EXTRAORDINARY MEETING.

An Extraordinary General Meeting of the Company was then held, for the purpose of:

1. Rescinding the resolution passed by the proprietors at an Extraordinary General Meeting of the Company held on Friday, Feb. 29, 1924, authorizing the Directors to raise additional capital in accordance with the provisions of the Bournemouth Gas and Water Act, 1913, by the creation and issue of 10,000 ordinary ("B") and/or preference shares of £10 each limited as to the ordinary ("B") shares as to dividend in any one year to the sum of £7, and as to the preference shares to £6 respectively for every £100 actually paid up on such shares exclusive of any sum paid by way of premium.
2. Authorizing the Directors to raise additional capital
   (*a*) in accordance with the provisions of the Bournemouth Gas and Water Act, 1913, by the creation and issue of ordinary ("B") and/or preference shares of £10 each limited as to the ordinary ("B") shares as to dividend in any one year to the sum of £7 and as to the preference shares to £6 respectively for every £100 actually paid up on such shares exclusive of any sum paid by way of premium, sufficient to produce, with the premiums thereon, the sum of £60,626 19s.
   (*b*) And to raise additional capital in accordance with the provisions of the Bournemouth Gas and Water Act, 1919, by the creation and issue of 15,000 ordinary ("B") and/or preference shares of £10 each limited as to the ordinary ("B") shares as to dividend in any one year to the sum of £7 and as to the preference shares to £6 respectively for every £100 actually paid up on such shares exclusive of any sum paid by way of premium.

The Chairman, moving resolutions to this effect, said that by the first they rescinded a previous resolution, as a matter of form, to clear the ground for the second one. Really the Directors were asking the proprietors to authorize them to complete the capital issue under the 1913 Act, and to raise additional capital under the 1919 Act. They were not asking for any borrowing powers, because the proprietors had conferred upon them such powers still unexercised to the extent of £100,000. The necessity for this money was the expenditure he had been talking about. A year ago he had told them that the cost of these new Poole works would be about £250,000, and therefore more capital must be issued beyond the two issues made last year, which produced together £142,941. He desired to take this opportunity of commending to the proprietors the issue about to be made. The Directors proposed to offer within the next week or two £125,000 nominal of 6 p.ct. preference shares, to rank with the existing preference shares. At present there were three issues of debentures which were a first charge on the undertaking, and the interest on these amounted to £14,081. Existing preference shares, which were the next charge, cost £9000 a year, and the new issue would require £7500. This represented a total charge of £31,481. To give but one illustration, if they looked at the water account, and imagined the gas-works gone altogether, there was enough profit in water alone to pay the great bulk of this charge; and adding the two profits together, and remembering the right to put up the price of gas, and so forth, it was an extremely well secured investment.

Scrutinize Offers in Small Concerns.

While on this subject, he would like to refer to the continual receipt by the proprietors in their Company, and in other companies, of offers of investments in certain small undertakings up and down the country. He suggested that when they received these offers they should scrutinize them carefully; and if proprietors in that Company liked to communicate with the head office, it would be a pleasure to give them such information as was available regarding the particular undertaking to which the offer might refer.

The Deputy-Chairman seconded the resolutions, which were at once unanimously agreed to.

The proceedings concluded with a cordial vote of thanks to the Chairman and Directors for their services during the past twelve months, which was passed on the proposition of Mr. Glen, seconded by Mr. Whittaker.

Littlehampton Preference Stock.—The issue of £10,000 of 6 p.ct. irredeemable preference stock which Messrs. A. & W. Richards recently offered for the Littlehampton Gas Company was three times subscribed, at prices ranging from £107 down to the minimum of par. The lowest successful tender was at £102 p.ct., and the average price obtained was £103 7s. 4d. p.ct.

Tenders for Luton Gas Stock.—The response to the invitation of the Directors of the Luton Gas Company for tenders for £20,000 5 p.ct. perpetual debenture stock was very satisfactory. The total amount applied for was £52,740, at prices ranging from £106 down to a minimum of £97. Applicants who tendered above £98 received allotments in full, and those who offered £98 received partial allotments. The average price realized was £98 11s. 4d. p.ct.

BARNET DISTRICT GAS AND WATER COMPANY.

A Satisfactory Increase in Business.

The Ordinary Half-Yearly General Meeting of the Company was held on Monday of last week, at the London Offices, No. 139, Cannon Street, E.C.—Mr. William Cash, F.C.A., presiding.

The Secretary (Mr. E. D. Davey, A.C.A.) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The Chairman, in moving their adoption, said there were one or two matters which he thought might be of interest to the proprietors. They would notice from the report that the business of the Company in both gas and water continued to expand. It was not unsatisfactory to find that, so far as the Gas Department was concerned, the increase in the output for the half-year to Dec. 31 had been 5 p.ct.; while in the Water Department the total receipts had increased in money to the extent of 8 p.ct. Taking the year as a whole, the respective increases had been, in gas 8·3 p.ct., and in water 7 p.ct. As had been the case with other gas and water undertakings, they had been affected by climatic conditions. During the first half of 1924 all gas undertakings experienced very satisfactory increases; but in the second half of the year the mild weather resulted in not quite such a good output. With regard to water, it was an extremely wet year, and the quantity supplied was only about 1 p.ct. more. Naturally, following upon a statement such as this, the proprietors would not be surprised to learn that the Directors would shortly have to issue additional capital. As a matter of fact, if they turned to the capital account, they would see that it was over-spent on Dec. 31 to the extent of £37,000. The Board were proposing to raise the remainder of the unissued gas capital (£15,000), and also a proportion of the debentures. The next step presumably which the Company would take before very long would be to apply to the Board of Trade for further powers in this direction. They had bought some more land on gas-works account, and had also spent a considerable sum of money on new mains in both departments. They had given an order for duplicate pumping plant for the North Mimms pumping station; and as regarded reservoir capacity, they had installed a pumping plant at the low-level reservoir, so that in time of need water from that could be used in the high-level district. In connection with the gas undertaking, the Board had in view an extension of the works; and plans were being prepared showing the lines on which they would proceed when the proper time arrived.

The reduction in the price of gas from 11d. to 10·5d. per therm during the half-year had meant a concession to the consumers of about £600; but, notwithstanding the reduction, the receipts from this source were some £500 more than a year ago. The price was equal to 4s. 1·8d. per 1000 c.ft., which compared with a pre-war rate of 3s. 4d., or an increase of a little over 20 p.ct., which he thought was very reasonable. On the other side of the account, coal had cost about £660 more than a year ago, partly accounted for by the increased quantity consumed; and oil and coke for carburetted water gas had also cost £325 more. As against this, the Company had been exceptionally fortunate in the results derived from the sale of coke; but, in common with other gas undertakings, they had been seriously affected in the opposite direction by the smaller receipts for tar. Coke had realized £550 more, and tar £900 less. Consequently the net cost of coal, less residuals, was higher than a year ago. Rates had gone up as the result of a partial re-assessment and re-arrangement; but a portion of this they had got back again by a decreased charge for rates on the water undertaking. The profit for the six months was not as high as a year ago; but that was an exceptionally good half-year. The balance of gas revenue carried to profit and loss account on the present occasion was £7228. In the water undertaking there was always a certain amount of expenditure going on. Their charge for water was about 20 p.ct. more than pre-war. This was the same proportionate increase as for gas, and again spoke very well for the management.

Turning to the net revenue account, the balance brought in from the two departments was £1000 less than a year ago, but they were able to pay their maximum dividends, and to carry forward some £840 less than they brought into the accounts. Following the practice for many years, anything of an experimental character was dealt with through the contingency account, and this was why the charge appeared for the North Mimms bore, which it was hoped would ultimately be entirely successful, and add to the available supply of water. On this occasion they were transferring £2500 to the contingency fund account, which left it nearly at the same figure as at the beginning of the half-year. The Company had always paid their workers, both in the gas and the water undertakings, the full rate of wages, and so far as gas was concerned a trifle more in respect of some of the employees. Further increases in gas-workers' wages came into operation on Jan. 1, which would cost the Company another £750 a year. The new coal contracts, commencing next June, were slightly better than the prices ruling to-day, but a further drop in the price of coke would have to be faced. Therefore, it would appear that there was no immediate probability of the Company being able to reduce the price of either gas or water; but, as he had shown, the consumers, compared with pre-war, had nothing to complain about, while so far as the proprietors were concerned, they were receiving practically the same dividend as pre-war. The Directors had considered from time to time the question of providing a contributory pension fund, for they had many old servants; but, of course, the cost under these circumstances would be greater than if they started with all young men. Before binding themselves to anything, they would consult the men, and then ascertain the cost.

The Deputy-Chairman (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion, which was unanimously adopted.

On the proposition of the Chairman, seconded by Mr. Colin Docwra, dividends were declared, less income-tax, for the half-year

to Dec. 31, at the rates per annum of 10 p.ct. on the "A," "B," and "C" stocks, and 7 p.ct. on the "D" capital gas and water stocks.

The retiring Directors (Dr. J. W. L. Glaisher and Mr. William Richards) were re-elected, on the proposition of the CHAIRMAN, seconded by Mr. ALFRED WOOD; and the retiring Auditor (Mr. C. P. Crookenden) was re-appointed on the motion of Mr. J. M. WOOD, seconded by Mr. F. J. BANCROFT.

The CHAIRMAN proposed a hearty vote of thanks to the officers, staff, and workpeople generally for their services during the past half-year. Comparatively recently they had had a new Engineer in Mr. Haseldine, who was doing excellent work on their behalf; while Mr. Davey was well known to them as being associated with a firm who had a great deal to do with gas and water undertakings. By the whole of their employees they were excellently served.

Mr. BANCROFT, who seconded the motion, said he first came in contact with the men in 1886, and during the whole of his long service with the Company they had been thoroughly zealous and loyal. He was, therefore, glad to hear what the Chairman had said about the pension scheme.

The resolution was cordially agreed to, and acknowledged by Mr. HASELDINE and Mr. DAVEY.

The proceedings concluded with a vote of thanks to the Chairman and Directors, on the proposition of Mr. H. F. PARDY, seconded by Mr. C. A. MORGAN.

CROYDON GAS COMPANY.

Presiding at the Annual Meeting of the Croydon Gas Company, on Feb. 27, Mr. WILLIAM CASH made reference to the death during the year of Mr. Samuel Spencer, one of the oldest Directors. The net balance carried to the revenue account was £42,592 less than a year ago; the main reasons for this being the reduction in the price of gas and the fall in the market values of residuals. Though the consumption of gas showed an increase of 8·67 p.ct., the receipts were £3000 less than for the corresponding period of 1923. In October of that year the Directors brought the price down to 9d. a therm, and in April last it was reduced still further to 8·8d. Those reductions were equivalent to £41,400, which practically constituted the decrease in profits. The volume of business gave every satisfaction. In the June half-year it increased as much as 11·8 p.ct., and for the December half 5½ p.ct. As an instance of the Company's progress, they had added 2757 consumers during the year—an average of 53 a week. The selling policy had fully justified itself; the sales of appliances in the period under review being £55,000. It was proposed to develop this policy; and already negotiations had been entered into for the acquisition of properties at Purley and Wallington—two growing areas.

Dealing with the dispute regarding wages in the gas industry, Mr. CASH said the Company had always paid the full standard applicable to the district, and in addition had provided for the co-partnership scheme and the sports fund. It had been felt by the employers who were associated with the National Federation that the latest claim put in by the Unions was not justified. As the Company's relations with those who served them had always been most cordial, they hoped the present difficulties might speedily disappear. They would not be surprised, in view of the circumstances, that it would be necessary to increase the price of gas. The accounts showed that, after deducting the June half-year's dividends (at the same rate as those now proposed to be paid), and providing for all fixed charges, there remained for division a balance of £39,545; and the Directors recommended that dividends be paid for the half-year at the following percentage rates per annum, less income-tax: Preference stock, 7⅓; sliding-scale stock, 6½; maximum dividend stock, 5; leaving a balance of £6471 to be carried to the next account.

The CHAIRMAN moved the adoption of the report and statement of accounts, and Mr. THOMAS RIGBY (Deputy-Chairman) seconded. There was unanimous approval.

Replying to votes of thanks from the Directors, Mr. ARCHIBALD CADDICK (Engineer and Works Manager) spoke for the producing staff; and Mr. W. J. SANDEMAN (Distributing Engineer and Sales Manager) for the distributing staff. Mr. Sandeman mentioned that 18,258 gas appliances were supplied last year. The Company's consumers numbered 57,500, and there were over 61,000 stoves on hire. During the year over 95,000 orders were carried out.

An Extraordinary Meeting gave the Directors power to raise £323,000 at such times as they thought best. The CHAIRMAN intimated that in the comparatively near future they would require a considerable sum of money for the extension of the manufacturing plant at Waddon and for the erection of another retort house. The continuous expansion of business left no room for pessimism.

Gas-Guessing at Birmingham.

Considerable public interest has been taken in the gas-guessing competition organized by the wholesale and retail traders' section of the Birmingham Chamber of Commerce, on behalf of the Lord Mayor's fund for the relief of unemployment distress. Competitors were required to forecast the output of the Birmingham Gas Department on Feb. 17, 19, and 21, and a large number of prizes were offered for those who gave the nearest figures. Over 10,000 shilling tickets were sold. The actual output was: Tuesday, Feb. 17, 48,392,000 c.ft.; Thursday, Feb. 19, 49,618,000 c.ft.; Saturday, Feb. 21, 38,709,000 c.ft. The necessary examination of the figures on the competition papers was carried out by a voluntary staff from the Gas Department; and on Wednesday last the Lord Mayor (Alderman P. Bower) attended at the department and thanked the workers for their help.

GAS COMPANY RESULTS IN 1924.

Chichester.

The half-yearly meeting of the Company was held on Feb. 24. The Chairman, Mr. W. W. Walker, in moving the adoption of the report and accounts, mentioned the satisfactory increase in the sales of gas, which amounted to over 5½ p.ct. The balance standing to the credit of profit and loss account amounted to £5942, out of which the Directors recommended the declaration of a dividend for the half-year at the rate of 10 p.ct. per annum on the "A" capital stock, and 7 p.ct. on the "B" and "C" capital stocks, all less income-tax. This would absorb the sum of £1567, leaving the balance to be carried forward. Mr. W. Ellis had been appointed Secretary, in succession to the late Mr. V. Vick.

Derby.

Satisfactory results regarding the past year's operations were recorded at the annual meeting of the Derby Gas Company, which was held on Friday, under the presidency of Mr. W. Woolley; the report showing that there had been an addition of 621 to the number of consumers and an increase of 2002 in the number of gas cooking stoves and fires sold or on hire. The reconstruction of vertical retorts at the Cavendish Street Works, at an estimated cost of £25,000, had been put in hand, and also the reconstruction of sulphate of ammonia buildings and plant at the Litchurch Works, at an estimated cost of £15,000. The Chairman, in moving the adoption of the report, which was agreed to, said the total number of consumers was now 38,251, and the figures in the balance-sheet showed that the Company would soon be compelled to raise additional capital to meet the requirements of their rapidly growing business. Such had been their extensions that their mains, if laid in a straight line, would reach to London and back. The demand for gas had increased in Derby during the last ten years to such an extent as to lead to the doubling of the output. It was proposed that the dividend should be the same as last year, 4½ p.ct., which, with the payment for the June half-year, would make 7½ p.ct. for the annual period. In order to alleviate to some extent the present shortage of houses, the Directors had erected, for the use of the employees, several detached dwellings, slightly larger than the best-class Corporation house. To encourage the use of gas for motive power purposes, it had been decided to let out gas engines upon favourable simple-hire terms. Cordial congratulations were forthcoming to Councillor J. Ferguson Bell upon his appointment as President of the Institution of Gas Engineers.

Exeter.

A reference to the competition of electricity and the suggestion of State aid for that means of power and lighting was made by the Chairman of the Exeter Gas Light and Coke Company, Mr. G. Hardy Harris, at the annual meeting on Feb. 23. The report and accounts for 1924 showed that during the past year the sale of gas had increased by 160,830 therms, equal to nearly 34 million c.ft., a percentage increase of 6·17, compared with 4·41 in 1923, 4·55 in 1922, and 2·84 in 1921. In moving the adoption of the report, Mr. Hardy Harris said these figures showed distinctly that the Company were supplying what the people wanted, and at a price which commanded the market. The Company had maintained a stable dividend, and he attributed this to the fact that they had been able to make large reductions in the price of gas. The accounts showed that revenue from sales of gas had dropped only by £5487. If they had made the same charge as last year they would have had an increase of over £6000. There were now 11,013 cookers, &c., on hire in the city and district. Speaking generally, the business of the Company had satisfactorily increased during the past year. Their price for gas was only 36 p.ct. above the pre-war figure; and when it was remembered that coal alone cost them 75 p.ct. more, and wages, &c., 164 p.ct. more, and they took into consideration the fact that for what they paid £100 before the war they now had to pay £234, it would be seen that they were supplying as cheaply as possible. In regard to maintenance of works, generally speaking they had made up their war arrears, and the works were now in a satisfactory condition. Much expenditure was, however, ahead of them, both in ordinary renewals and in extensions required to cope with the increasing output. The only addition to capital during the year was £1761; the remainder of their expenditure having been provided out of income. The profit for the year was £12,225, as against £9782 in the previous year. A great number of companies had been obliged to draw upon their reserves to pay their customary dividends, but they were not in that position. There was some talk about giving the electricity industry State assistance. This was a matter for Parliament to deal with; but it seemed to him that to subsidize or assist any one industry was to establish a false basis. The effect would be that the consumers or persons requiring the product of that industry would reap a benefit at the expense of the taxpayers generally. As to the future prospects of their Company, there were indications that the demand for gas was increasing; and they had every reason to hope and believe that the output would continue to advance. Owing to increased work, Mr. W. N. Westlake, the Engineer and General Manager, had been relieved of the secretarial work, which had been entrusted to Mr. Ernest H. Dart, who had been assisting him. Mr. Collier, of Preston, had been appointed Assistant Manager. Mr. J. E. Daw seconded the report, which was adopted, together with the Directors' recommendations as to dividends—viz., 4 p.ct. on the preference stock, 5 p.ct. on the preference shares, 7 p.ct. on the new ordinary shares, and 10 p.ct. on the original stock.

Hartlepool.

The annual meeting of the Hartlepool Gas and Water Company was held on Feb. 26. Mr. J. S. Appleby, who moved the adoption of the report and balance-sheet, said the latter showed a total revenue of £163,720, with a balance to profit and loss account of £26,034. After payment of £8186 for interest on loan capital, they recommended the payment of the maximum dividend of 5 p.ct., less tax, carrying forward £12,578 to the next account, as compared with £12,584 the previous year. Considering the serious drop in the return from residual products, the result of the year's operations was satisfactory. An increase in consumption, despite the depressed state of trade, was particularly pleasing. The gas sold, notwithstanding an increased consumption of 15 million c.ft., returned £5153 less

revenue, due mainly to the reduction in price which came into operation as from the meter readings of December, 1923. As a direct result of the fall in revenue from tar and coke, and also because of the fact that wages were again on the upward grade, the Directors had decided to revert to the price of gas ruling at the time the last reduction was made. This was 8½d. per therm, less the present discounts, making the price equal to 3s. 3·9d. net per 1000 c.ft. for gas used for all purposes other than power.

Leighton Buzzard.

At the annual meeting of the Company on Feb. 26, the Directors' report showed a balance of £4180 on the revenue account and £4324 on the profit and loss account. It was recommended that a dividend at the rate of 6 p.ct. per annum be paid on the consolidated ordinary stock, and that the sum of £234 be carried to the reserve fund. The Chairman (Mr. R. Richmond) stated that the reductions made in price during the year decreased the revenue by £2500. The present price of 11d. per therm, equal to 4s. 4½d. per 1000 c.ft., showed a reduction of 7½d. per 1000 c.ft. since January, 1924. The Company supplied 2939 houses, and the output of gas was 3½ p.ct. more than in the previous year.

Newcastle.

The annual general meeting of the Newcastle-upon-Tyne and Gateshead Gas Company was held on Feb. 24—Mr. John E. Cowen presiding. In moving the adoption of the Directors' report and balance-sheet, the Chairman said this was the first annual meeting since the amalgamation of the Walker and Wallsend and Chester-le-Street Gas Companies with the Newcastle Company. The accounts of the three companies were consolidated in the accounts under review, but those of the Chester-le-Street Company were only for eight months, as their financial year commenced on May 1. The expenditure on capital account during the year had been £26,705, but there had been credits amounting to £77,568. Coal and oil had cost more compared with the previous year, partly due to increased quantities carbonized and partly to increased price. Distribution showed an increase. The total receipts showed an increase of about £8000 over the previous period. Though there had been an increased sale of gas of 4¾ p.ct. the receipts were less, owing to the average price in 1924 being less than in 1923. Rentals of meters, cookers, and fires again showed an increase, due to the greater number of appliances now on hire as a result of their advertising and sales development work. Residuals on the whole had yielded a small increase. The balance carried to the net revenue account was about £15,000 less than in the previous year—that was, taking the three Companies into account. The dividend was the same as last year. The transfer of the funds from the two acquired companies made the reserve fund £86,950, and the amount carried forward was £52,250. The Pension and Widows' and Orphans' Funds which were authorized at last year's meeting were operating with benefit to the members. Of the employees eligible, 97 p.ct. had joined the scheme. They had, of course, extended it to include the employees of the two acquired Companies. A large new governor house at Redheugh was put into operation in December last, whereby the supply of most of the gas on the south side of the river was being controlled, as had been the case for many years on the north side through the governor house at Maiden Street. A further small governor house would be erected during this year, so that the remainder of the gas from the Redheugh Works might be likewise controlled. It was also proposed during the present year to renew and extend some of the purifying plant at the Elswick Works, and to reconstruct and enlarge a holder at the Redheugh Works. It had been arranged that accommodation would be provided for the laying of two large mains over the new high-level bridge across the Tyne, which would provide additional means for conveying gas across the river. The declared calorific value of the gas supplied was different in the areas of each of the Companies now amalgamated. It was 475 B.Th.U. in Newcastle, 500 in Chester-le-Street, and 525 in Wallsend. It was intended at an early date to declare a uniform calorific value throughout the whole area, and to connect up the mains of the three districts with a view to supplying the whole in the most economic manner. The question of the pollution of the atmosphere by smoke was becoming more acute every day. The Medical Officer of Health estimated that the city was deprived of one-third of its sunshine by the smoke nuisance. This could only be overcome by the greater use of smokeless fuels. Their Company supplied smokeless fuels, both gaseous and solid. The cleanliness and convenience of gas for all domestic purposes was already recognized, but the merits of gas coke as a domestic smokeless fuel were perhaps not so well known. Where a solid fuel was preferred, gas coke was well worth a trial, and would be found to give a hot, cheerful fire with a notable absence of smoke. The report was adopted.

Reading.

The annual general meeting was held on Feb. 24—Mr. G. W. Webb, J.P., presiding. The sales last year showed an increase of 55,775,300 c.ft., and the annual output now exceeds 1000 million c.ft. The price of gas was reduced from midsummer, making a total reduction since Lady Day, 1922, of 3⅛d. per therm. On Oct. 25 the Company were successful in obtaining an Order from the Board of Trade under which the Pangbourne gas undertaking was transferred to the Company. An issue of £15,000 5 p.ct. redeemable debenture stock was made in October to cover the cost of the Pangbourne and other main extensions. The issue was made at the minimum price of par, and was over-subscribed; only partial allotments being made at the minimum price. The Directors recommended the payment of dividends for the past six months at the statutory rates. Mr. Webb stated the number of gas appliances sold and let out on hire constituted a record. Mr. D. H. Helps, replying to a vote of thanks accorded to the staff, said that during the year no less than 15 miles of main had been laid at a cost of about £45,000, including 4 miles of 12-in. main laid to Pangbourne.

Romford.

The half-yearly meeting of the Romford Gas and Coke Company was held on Feb. 21—Mr. H. Johnson (Chairman) presiding. The Chairman said that the half-year had shown material progress in the sale of gas; the output being 15 million c.ft. over the corresponding half-year of 1923. The price was 0·4d. per therm less than that of 1923; but the result of the increased sales was an increase of £2282 in receipts. The number of consumers had been increased by 447 during the year, and 203 new cookers, 211 fires, 16 radiators, 46 geysers, and 68 wash-boilers had been fixed during the half-year. The report of the directors and statement of accounts were adopted, and dividends of 7½ p.ct. on the original shares, 5¾ p.ct. on the "B" shares, and 3 p.ct. on the preference shares were declared.

Sunderland.

Alderman W. F. Vint presided at the annual meeting of the Company on Feb. 26. Moving the adoption of the annual report and balance-sheet, he said they had been able to pay their usual dividend, and carry something to reserve. Altogether the year's results were a matter for congratulation. The gas sold had increased by 7 p.ct., but the Directors had had to advance the price by 3d., making it 2s. 6d. per 1000 c.ft. The advance was due to the fall in the prices obtained for residuals. The Company would shortly be obliged to adopt the therm system, and the price would be 6d. per therm. Speaking of the issue of £15,000 of new stock, the Chairman said the Company's capital remained very low. The report and balance-sheet were adopted, and a dividend of 3 p.ct. for the six months ended Dec. 31, making 6 p.ct. for the year, less income-tax, was declared. After the meeting, £15,000 of ordinary stock in the Company was sold by auction; all the shares realizing £106 10s., except £800, which brought £107 per £100 share.

Swansea.

The annual meeting was held on Feb. 24—Mr. E. H. Leeder, the Chairman, presiding. In moving the adoption of the report and accounts, the Chairman mentioned that the expenditure was £196,385, and the receipts totalled £243,602, leaving a balance of £47,217. The sales of gas showed an increase of 5·06 p.ct. over those of 1923, and 31·3 p.ct. over those for 1914. There had been an expenditure on capital on new buildings to the extent of £116,157, on new mains, &c., £20,488, as well as smaller amounts on new meters and fittings. This had been occasioned by the payments made throughout the year on the new works at Morriston. Residuals, unfortunately, had not maintained the revenue of the previous year; and the outlook for the coming year was not encouraging. The report and accounts were unanimously adopted, and dividends at the rate of 7 p.ct. per annum on the redeemable preference stock, and 5 p.ct. on the ordinary stock were declared.

Wellington (Salop).

The annual meeting of the Wellington Gas Company was held on Feb. 24—Mr. C. W. Leake (Chairman of the Directors) presiding. The statement of accounts showed that the total expenditure for the year was £22,388, against £22,913 for 1923—a decrease of £525. The Chairman stated that the sale of gas realized £22,947, against £23,515 for 1923—a decrease of £568. The net result of the year's trading showed a profit of £6104, against £6498 for 1923. The balance of net profit to be carried forward subject to half-yearly dividend to Dec. 31 was £4693. The selling price in 1924 entitled the stockholders (ordinary) to a dividend of 6¾ p.ct., but the Board thought it advisable to declare 6½ p.ct., and to carry the balance of £138 to reserve. A further sum of £500 had been transferred from profits to the special purposes fund, making the balance £770.

Weston-super-Mare.

The sales of gas amount to 1,655,056 therms, or 348,433,000 c.ft., compared with 334,462,700 c.ft. in 1923—an increase of 4·17 p.ct. Two advances in wages have been awarded, and the prices of coal and other raw materials have increased. Special renewals to plant have been carried out during the year; the cost (£5911) having been defrayed from revenue account. This has necessitated the transfer of £4500 from reserve fund to the profit and loss account. The Directors recommend the payment of the maximum dividend of 5 p.ct. on the ordinary stock, and the maximum dividend of 6½ p.ct. on the 6½ p.ct. redeemable preference stock for the half-year ended Dec. 31, less income-tax. [The meeting is to be held to-day.]

Whitby.

The ordinary general meeting of the Company, which was followed by an extraordinary general meeting, was held on Feb. 24—Mr. Thomas Warters presiding, in the absence of the Chairman (Mr. Richard Smailes, J.P.) through indisposition. The Chairman said that during the past year there had been expended on capital account for new mains, meters, and stoves a sum of £513. The Directors were pleased to report that the business of the Company continued to expand, and the demand for gas was greater than ever. The receipts from tar had unfortunately fallen very considerably. The receipts on revenue account were £17,045, as against £17,489. The expenditure, however, was less, being £14,491. In 1923 it was £14,972. The balance carried to profit and loss was £2554, and the balance available for dividends £1078. In consequence of the development of building sites on the outskirts of the town, the Directors had thought it desirable to duplicate certain mains, in order to maintain a better supply of gas to the portions of the area of supply in which there had been at certain periods of the day a considerable reduction in pressure. This linking-up was already proving of considerable benefit to consumers, and would result in a general increased consumption. On this account there had been an expenditure of £2096, which had been placed to suspense account. New purifiers had also been erected at the works, which would result in further economy. The Directors' report and statement of accounts were passed, and the usual dividends declared. At the extraordinary meeting which followed, the Directors were empowered to raise £6000 redeemable preference stock.

Wolverhampton.

The accounts of the Wolverhampton Gas Company show that the net profit for the past year amounts to £25,224, compared with £20,048 for 1923. Dividends are maintained on the consolidated stock at the rate of 5½ p.ct., and on the new ordinary stock at the rate of 3½ p.ct., both less tax, which will require £15,332. It is proposed that £806 received from interest, and a further sum of £3820, be placed to reserve, leaving a balance of £5265 to be carried forward. In moving the adoption of the report and accounts, Mr. J. W. Tilley said that the trading for the past year showed the gratifying increase of 12 p.ct. in the output of gas.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The market closed for the second month of the year without any improvement; with conditions, in fact, becoming steadily worse. Prices do not show much change, because collieries maintain they are at the minimum possible, and most of them are working short time to adjust supply to demand. Practically all new business that matures is for immediate requirements, and is of the hand-to-mouth order. There is also an entire absence of the inquiry which usually precedes any likely trouble or stoppage in the industry. Stocks and visible supplies elsewhere are evidently ample.

There is no great demand for gas coals, though they still maintain the best prices. Wear Specials quote 21s. 3d., and best qualities about 20s. 6d. to 21s. f.o.b. As already explained, some of these producers are losing time rather than accept big reductions in price, but this, of course, does not imply that they will not accept definite business at below their nominal quotations. Other qualities of gas are 17s. 9d. to 18s. Durham unscreened coking are very weak at 17s. 6d. to 18s., and bunkers are 18s. to 18s. 9d., according to quality.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

In no direction is there any sign of a broadening of demand. Some of the gas-works are not in a position to take full deliveries under their contracts, with the result that there are spot lots on the market for which it is difficult to find buyers even at a substantial sacrifice of price. The slump in gas coke is aggravated by the falling off of shipments and the moderation of the local domestic consumption. There is only a very slow call for household coals, and it is supplied largely out of stocks which have been accumulated in the distributive channels. The diminution in the production of smalls keeps values steady in that department. Prices of the best grades of household coal are upheld. In other directions values are weak and irregular. The general industrial demand is unresponsive.

As regards furnace coke, market operations are characterized by caution. Three months contracts are on about the same level as the scale to which furnacemen refused to commit themselves at the close of last year, but it is possible to get better terms by making full use of current market instability, some of the producers having apparently over-estimated the potential strength of demand, and being anxious now to find openings for supplies over which they considered it good policy to retain a free hand when a revival in the pig-iron industry appeared to be more hopeful.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

There does not appear to be any material alteration in the state of the coal trade in Yorkshire and Lancashire since last week, except that house coals are in better demand. Prices, however, remain steady. The larger industrial concerns are not at the moment able to buy in the open market, owing to contracts.

Gas coals are steady, with indications of a slight decrease in price for forward renewal of contracts.

The Continental position remains about the same, with no immediate prospect of alteration.

Prices at Hull at the week-end were: Humber bunker and exports, f.o.b. usual shipping ports. South Yorkshire: Hards, 20s. 3d. to 20s. 6d.; screened gas coal, 22s.; washed trebles, 22s.; washed doubles, 18s. 3d. to 19s.; washed singles, 18s. to 18s. 6d.; washed smalls, 14s. 6d. to 15s.; unwashed doubles, 16s. 6d.; rough slack, 11s. 9d. to 12s. 3d.; smithy peas, 21s. 6d. to 24s. West Yorkshire: Hartleys, 18s. to 20s. 6d.; screened gas coal, 21s. to 22s.; washed trebles, 19s.; washed doubles, 18s. to 19s. 6d.; washed smalls, 14s.; unwashed trebles, 18s. to 19s.; unwashed doubles, 15s. 3d.; rough slack, 11s. 6d. to 12s.; coking smalls, 12s. Derbyshire and Nottinghamshire: Top hards, 19s. 6d. to 21s.; washed doubles, 18s. to 19s.; washed singles, 18s.; washed smalls, 14s.; unwashed doubles, 15s. to 16s.; rough slack, 11s. 6d. to 12s. 3d. Yorks, Derby, and Notts: Screened steam coal, 17s. 6d. to 19s. 6d.; gas coke, 20s. to 27s.; furnace coke, 17s. 6d. to 18s. 6d.

CONTRACTS OPEN.

Pipes and Specials.

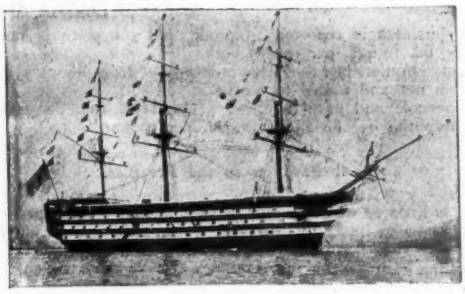
The Gas Committee of the Wolstanton Urban District Council are inviting tenders for the supply and delivery of cast-iron and steel pipes and specials. [See advertisement on p. 556.]

EXTENSIONS.

Telpher Plant at Plymouth.

The Plymouth Corporation Gas Committee have decided to instal an additional coke telpher machine at a cost of £1000.

Reductions at Plymouth.—The Plymouth Corporation Gas Committee have decided to reduce the charge to ordinary consumers, from the meter reading of the Lady Day quarter, from 2s. 11d. per 1000 c.ft. (7·77d. per therm) to 2s. 9d. (7·33d. per therm), and to power consumers from 2s. 8d. to 2s. 6d. per 1000 c.ft. Where the supply is by prepayment meter, with Corporation fittings, the discount allowed on the charge of 1d. per 20 c.ft. will, as from May 1, be increased from 5¾d. to 7¼d. per 1000 c.ft., and where there are private fittings, from 1¼d. to 3¼d. per 1000 c.ft. It was reported by the Engineer that the output during January showed an increase of 5·34 p.ct. over the corresponding month of last year.



THE

OLD VICTORY,

AND THE

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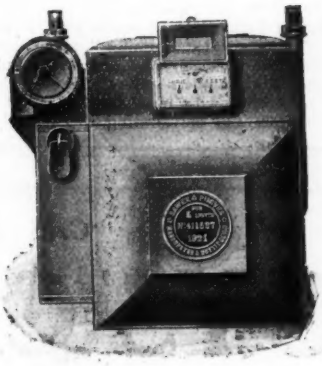


BOTH SUPREME!

SAWER & PURVES,

MILES PLATTING, MANCHESTER.

RADFORD ROAD, NOTTINGHAM.

45-47 WESTMINSTER BRIDGE RD., LONDON, S.E.1.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, March 2.

Little business is reported in pitch, and the price is nominal at from 42s. 6d. to 45s. per ton in bulk.

Creosote is quiet, but the price is steady at from about 7⅜d. to 7½d. per gallon net and naked at works.

Pure benzole and pure toluole are about 1s. 10d. per gallon, and solvent naphtha 95/160 about 1s. 7d. per gallon.

Tar Products in the Provinces.

March 2.

There is little or no alteration in the markets for tar products.

Pitch seems to have steadied somewhat, although we do not hear of any large business having been done.

There has been a little more inquiry for creosote, which, however, has not affected the market.

In crude carbolic there is an occasional inquiry; but buyers' idea of price is still low.

Benzole and solvent naphtha remain unchanged.

The average values for gas-works products during last week were: Gas-works coal tar, 30s. 6d. to 35s. 6d. Pitch, East Coast, 41s. to 43s. f.o.b. West Coast—Manchester, 37s. to 38s.; Liverpool, 38s. to 39s.; Clyde, 41s. to 42s. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.ct., at 120° C., 9½d. to 10½d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 7½d. to 1s. 8½d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 6⅝d. to 6⅝d.; salty, 6¼d. to 6⅜d.; Scotland, 6¼d. to 6½d. Heavy oils, in bulk, North, 6⅜d. to 7d. Carbolic acid, 1s. 9d. to 1s. 10d. prompt. Naphthalene, £12 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 3d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Seaton Gas Company.—Presiding on Feb. 26 at the annual meeting of the Seaton Gas Company, Mr. C. F. Gosney said that the output of gas had increased, the revenue showed a steady advance, and the profits were fully maintained. Some of the old plant had been replaced during the year by more modern apparatus. A dividend of 6 p.ct., less tax, was declared.

The Gas-Heated Boiler.—Mr. Frederick W. Dye recently lectured at Cardiff on "The Gas-Heated Boiler" to employees of the Cardiff Gas Company, representatives of other gas undertakings in the locality, architects, and plumbers—Mr. H. D. Madden occupying the chair. The lecturer dealt with his subject in a practical and useful manner, and at the close of the meeting was heartily thanked.

Swindon Debenture Issue.—Messrs. A. & W. Richards have been instructed by the Directors of the Swindon United Gas Company to offer for sale by tender £56,240 of 5 p.ct. perpetual debenture stock in the Swindon United Gas Company, at the minimum price of £95 p.ct. The capital will be utilized in paying off £26,135 of redeemable mortgages, and for extensions of the Company's works, plant, and mains, rendered necessary by the constantly growing demand for gas. Tenders must be sent in to the firm at No. 37, Walbrook, not later than Thursday morning, March 19.

The Lytham St. Annes Corporation are applying to the Ministry of Health for sanction to borrow £10,000 for the purchase of gas cookers and meters.

The Brixham Gas Company having offered to light that town for £800 for twelve months until 11 p.m. each day on a three years' contract, the Urban Council recently decided to ask the Company to do the lighting for £800 on a one year's contract.

The Liskeard Gas Company, Cornwall, last week decided to form the present proprietary company into a limited liability company. The Company have received the Town Council's sanction to undertake a general scheme of electric lighting and power supply for the borough.

The Crediton Urban Council have received an intimation from the Crediton Gas Company that they intend to reduce the price of gas ¼d. per therm at Lady Day, and a further ¼d. per therm at Midsummer, making a reduction of 1½d. per therm during the past twelve months.

Bolton contemplates schemes costing £1,500,000, in the Bill now being promoted in Parliament. This represents nearly £400,000 more than the borough's rateable value. The amount of expenditure provided for in the Bill includes £200,000 for the purposes of the gas undertaking.

The Preston Town Council have decided to illuminate the streets of the borough with electricity. Councillor Ellison argued that a large sum had been spent on the erection of the Ribble Power Station, and they ought to take advantage of their own supply, instead of that provided by a private Gas Company.

The Works Foremen's Association of the South Metropolitan Gas Company are making a visit to the underground system of streets in the City, similar to that made by the London and Southern District Junior Gas Association many years ago. They will be accompanied by Mr. F. A. Frost, late President of the London Juniors. Mr. W. J. Liberty, of the Corporation of the City of London, will pilot the party through, and explain the origin and utility of the underground labyrinths from a company's distribution point of view.

GAS REGULATION ACT, 1920.

BOYS' CALORIMETER

CALORIMETERS

PRESCRIBED BY

The Gas Referees

ARE

MANUFACTURED

:: PRINCIPALLY ::

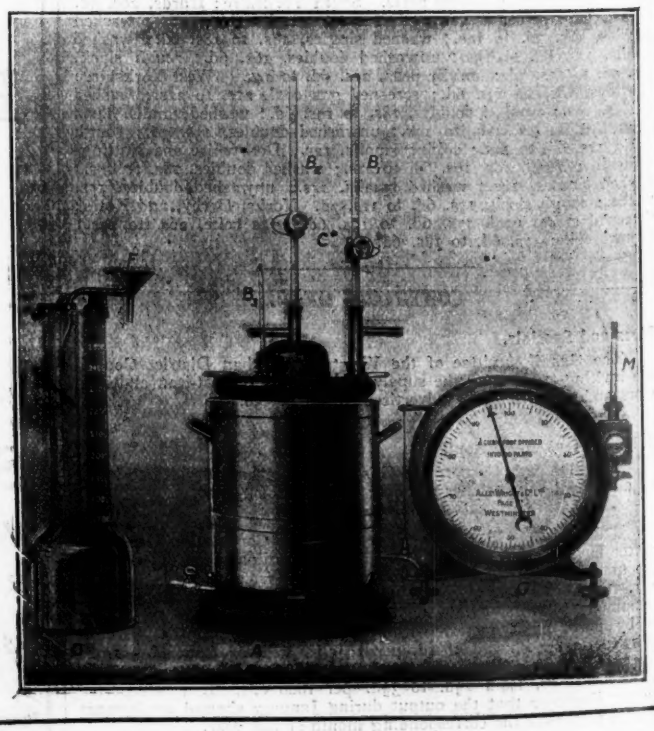
BY

ALEXANDER WRIGHT

& CO., LTD.,

1, WESTMINSTER PALACE GARDENS,

WESTMINSTER, S.W. 1.



STOCK MARKET REPORT.

THE past week opened in a particularly promising manner, but the change in the money conditions on Thursday brought about a marked fall in the values of most securities. Gilt-edged stocks, Home Rails, and the more prominent Industrial shares all weakened, and in the opinion of many the reaction was overdone. Owing to the proximity of the settlement many speculators closed their commitments on Friday, and this accentuated the downward movement. Previously, trustee stocks received a shock, owing to the complete failure of the three big issues under the Trade Facilities Act. The underwriters who were left with the bulk of the issues are not, however, likely to suffer, as the 1 p.c. margin is sufficient to ensure avoidance of loss.

In the Industrial Market there was a substantial turnover of business. In continuation of the experience of the previous week, there were enormous dealings in Courtaulds; but a study of the report reveals a warning, which will probably be amplified at the meeting, that considerable competition is anticipated in the future.

An issue of interest to the gas industry is that of 100,000 7 p.c. cumulative preference shares of £1 each, and 50,000 ordinary shares of £1 each, in Parkinson and W. & B. Cowan, the makers of meters, stoves, and other gas appliances.

From the reports received during the week it is seen that the Wandsworth Company have maintained the dividends paid for the previous half-year on their six ordinary stocks. The fall from 2 to 4 p.c. in the quotations of these stocks is doubtless due to the revision of the Company's standard price, which reduces the statutory dividends for the current half-year. Hastings and St. Leonards recommend equivalent payments on their 5 p.c. and 3½ p.c. stocks, and Brighton and Hove increase their rates by 1 p.c. per annum on both the original ordinary and "A" ordinary. The drop of 2 points in Gas Light ordinary is surprising, but is possibly due to the general depression.

The following transactions were recorded during the week:

On Monday, Aldershot "C" 79½, Alliance and Dublin 69, 69¾, Bournemouth "B" 12¾, 3 p.ct. debenture 58¼, 58¾, Gas Light and Coke 93¾, 94¾ *ex* div., 3 p.ct. debenture 61¼, 61½, 62, Imperial Continental 178½, 179½, Oriental 102½, 103½, Primitiva 9s. 6d., South Metropolitan 98¾, 99, 99¼ *ex* div., 3 p.ct. debenture 61¼, 61½ p.ct. debenture 105½, South Suburban 5 p.ct. 109 *ex* div., Tottenham "A" 117 *ex* div., "B" 100½, 100¾, 101 *ex* div. Supplementary prices, Gas Light and Coke 10 p.ct. bonds 195, Leatherhead new 4 p.ct. debenture 76¾.

On Tuesday, Alliance and Dublin 69, 69¾, 4 p.ct. debenture 67 1/16, Brentford 6 p.ct. Richmond debenture 103, British 117½, Continental Union 40½, European 8, Gas Light and Coke 93½, 93⅞, 94, 94¼, 94¼ *ex* div., 3½ p.ct. maximum 63¼, 63⅞, 64 *ex* div., Imperial Continental 179, 179½, Maidstone 5 p.ct. £126 18s. od. *ex* div., Primitiva 9s. 3d., 9s. 4½d., 9s. 9d. Supplementary prices, Aldershot "A" 100, Bath 92¼, Brentford 7½ p.ct. mortgages 101, Lea Bridge 7½ p.ct. debenture 106.

On Wednesday, Alliance and Dublin 4 p.ct. debenture 67, Bombay 5 5/16, 5⅜, Bournemouth "B" 13, British 118¼, Commercial 3½ p.ct. 94, Croydon maximum dividend 87½, European 8, Gas Light and Coke 93, 93½, 93⅝, 94 *ex* div., 3 p.ct. debenture 61, Imperial Continental 177½, 179, 179½, Newcastle 3½ p.ct. 84, Primitiva 9s., South Metropolitan 98½, 99 *ex* div., Tottenham "B" 101¼ *ex* div., Wandsworth (Wimbledon 5 p.ct.) 116. Supplementary prices, Lea Bridge 7½ p.ct. debenture 108, 108¼.

On Thursday, Brentford 4 p.ct. debenture 80, 80½, 6 p.ct. Richmond debenture 104½, Continental Union 7 p.ct. preference 90, European 7⅞, 7⅞, 8, Gas Light and Coke 92½, 92⅝, 93, 93¼, 93¼ *ex* div., 3½ p.ct. maximum 63¼, 64 *ex* div., 4 p.ct. preference 79½ *ex* div., 3 p.ct. debenture 61¼, Imperial Continental 178, 178½, 179 San Paulo 6 p.ct. preference 7⅞, 8, Sheffield "C" 105, South Metropolitan 98¼, 99, Tottenham "A" 118 *ex* div. Supplementary prices, Gas Light and Coke 10 p.ct. bonds 197.

On Friday, Alliance and Dublin 69, Commercial 4 p.ct. 95, 3½ p.ct. 95, European 7⅞, Gas Light and Coke 92¼, 92½, 92⅝, 93, 93¼ *ex* div., 3½ p.ct. maximum 63, 64, 64½ *ex* div., 3 p.ct. debenture 61¼, Imperial Continental 178⅝, Primitiva 10s., Swansea 7 p.ct. preference 105, Tottenham "B" 101 *ex* div. Supplementary prices, Consumers of Toronto 168.

The advance in the New York rediscount rate brought about the immediate announcement that the Bank of England had raised the rate for brokers' loans by 1 p.ct., to 5½ p.ct., and on the assumption that the Bank rate would be raised this week, loan and discount quotations were usually 1 p.ct. higher in consequence. Treasury Bills were allotted at £4 12s. 9·23d. p.ct., as compared with £3 14s. 2·26d. p.ct. the previous week.

Wide fluctuations occurred in the dollar-sterling rate. After dropping on Friday to 4·74, it finally rose to 4·76, and closed at 4·75⅞. The French franc was weaker at 92.42½, and the Brussels rate at 94.95. Italian lire were slightly dearer.

Silver was firm, and the price rose to 32⅝d. per oz. for cash. Gold was quoted at 87s. 3d. per oz.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 27.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C.	78—81	..	79½
235,492	"	"	4	4	Do. 4 p.c. Pref.	71—76	..	..
1,351,868	"	Sept. 25	6	6½	Alliance & Dublin Ord.	65—70	..	69—69½
374,000	"	Jan. 8	4	4	Do. 4 p.c. Deb.	61—66	..	67—67 1/16
300,000	5	Oct. 23	8	8	Bombay, Ltd.	4—5⅛	..	5 1/16—5⅛
100,000	10	Aug. 14	8½	8½	Bournemouth 5 p.c.	12¼—13½	..	..
425,050	10	"	7	7	Do. B 7 p.c.	12¼—13	..	12¾—13
150,000	10	"	6	6	Do. Pref. 6 p.c.	10¾—11½	..	..
50,000	Stk.	Jan. 8	3	3	Do. 3 p.c. Deb.	56—59	..	58½—58¾
162,025	"	"	4	4	Do. 4 p.c. Deb.	76—79	..	..
992,045	"	July 10	6 1/16	6 1/16	Brentford A Con.	110—115	..	..
990,500	"	"	6⅛	6⅛	Do. B New	110—115	..	..
76,000	"	"	5	5	Do. 5 p.c. Pref.	89—94	..	..
306,690	"	Dec. 18	4	4	Do. 4 p.c. Deb.	76—81	..	80—80½
181,337	"	"	—	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	103—104½
214,740	"	Aug. 28	11½	11½	Brighton & Hove Orig.	170—175	..	..
244,200	"	"	8½	8½	Do. A Ord.	124—128	..	..
1,287,500	"	July 24	5	5	Bristol 5 p.c. max.	96—97a	..	..
855,000	"	Sept. 25	7	8	British Ord.	115—120	..	117½—118½
100,000	"	Dec. 18	7	7	Do. 7 p.c. Pref.	123—128	..	..
120,000	"	"	4	4	Do. 4 p.c. Red. Deb.	72—77	..	..
100,000	10	Dec. 18	8	6	Cape Town, Ltd.	7—8	..	..
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
626,860	"	Feb. 19	6	6	Cardiff Con. Ord.	95—98	..	..
237,860	"	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb.	105—108	..	..
157,150	"	Feb. 19	5	6½	Chester 5 p.c. Ord.	89½—94½*b	..	..
1,513,280	"	July 24	6	6	Commercial 4 p.c. Cap.	94—97	..	95
560,000	"	"	6	6	Do. 3½ p.c. Cap.	94—97	..	94—95
475,000	"	Dec. 18	3	3	Do. 3 p.c. Deb.	57—60	..	..
800,000	"	14 Jan. 15	—	—	Continental Union, Ltd.	39—44	..	40½
200,000	"	Dec. 18	7	7	Do. 7 p.c. Pref.	88—92	..	90
660,000	"	Aug. 28	6½	6½	Croydon sliding scale	102—105	..	..
284,975	"	"	5	5	Do. max. div.	85—88	+1	87½
492,270	"	Feb. 19	6	9	Derby Con.	110—112*c	..	..
55,000	"	Jan. 8	4	4	Do. Deb.	74—76c	..	..
1,002,180	1	Jan. 22	6	4	European, Ltd.	7⅞—8¼	−¼	7⅞—8
16,460,070	Stk	Feb. 19	5½	5½	Gas Light & Coke 4 p.c. Ord.	91½—93¼*	−2	92½—94½
2,600,000	"	"	3¼	3¼	Do. 3½ p.c. max.	62—65*	+1	63—64½
4,062,235	"	"	4	4	Do. 4 p.c. Con. Pref.	79—81	..	79½
4,761,930	"	Dec. 18	3	3	Do. 3 p.c. Con. Deb.	60—63	..	61—62
130,000	"	—	10	10	Do. 10 p.c. Bonds	..	..	195—197
42,000	"	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	"	Sept. 11	6½	6½	Hastings & St. L. 5 p.c. Conv.	95—100	..	..
258,740	"	"	5½	5½	Do. 3½ p.c. Conv.	75—80	..	..
70,000	10	Sept. 25	10	10	Hongkong & China, Ltd.	16—17	..	..
86,600	Stk.	Aug. 14	10	10	Hornsey 7 p.c.	142—147	..	..
1,976,000	"	Nov. 20	30	10	Imperial Continental Cap.	175—180	−3	177½—179½
263,950	"	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	71—74	..	..
235,242	"	Aug. 14	6½	6½	Lea Bridge 5 p.c. Ord.	98—103	..	..
2,127,340	"	Feb. 19	5½	5½	Liverpool 5 p.c. Ord.	90—90½b	−1½	..
600,000	"	Sept. 25	7	7	Do. 7 p.c. Red. Pref.	106—109b	..	..
165,736	"	Feb. 19	9	8	Maidstone 5 p.c. Cap.	122—132	..	£126/18/0
63,480	"	Dec. 18	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 4	7	5	Malta & Mediterranean	4—4½	..	..
541,920	Stk.	Nov. 20	4	4	Montevideo, Ltd.	62—67	..	..
2,061,315	"	July 24	5½	5	Newcastle & Gateshead Con.	85½—86½d	−2	84—86
300,929	"	"	4	4	Do. 4 p.c. Pref.	74—75d	..	..
529,705	"	Dec. 18	3½	3½	Do. 3½ p.c. Deb.	68—69d	..	..
15,000	10	Aug. 28	11	11	North Middlesex 10 p.c.	16—17	..	..
75,940	10	"	7 7/16	7 7/16	Do. 7 p.c.	11¼—11½	..	..
300,000	Stk.	Dec. 4	7	9	Oriental, Ltd.	100—105	..	102½—103½
138,120	"	Jan. 8	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	109—114	..	..
60,000	50	Aug. 28	13	13	Portsea Island B	99—102	..	..
100,000	50	"	12	12	Do. C	95—100	..	..
2,289,909	1	—	—	—	Primitiva Ord.	9/3—10/3	..	9/0—10/0
311,100	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	78—80	..	..
600,000	Stk.	Jan. 22	4	4	Do. 4 p.c. Red. Deb. 1911	63—65	..	..
220,335	"	Dec. 18	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
321,670	"	"	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref.	7½—8¼	..	7⅞—8
125,000	50	Jan. 2	5	5	Do. 5 p.c. Red. Deb.	43—46	..	..
270,000	Stk.	Aug. 28	5/8/4	5½	Sheffield A	104—106e	..	..
419,968	"	"	5/8/4	5½	Do. B	104—106e	..	..
1,047,000	"	"	5/8/4	5½	Do. C	104—106e	..	105
90,000	10	Oct. 23	8	6	South African	7—9	..	..
6,609,895	Stk.	Feb 19	5	6½	South Met. Ord.	98—100*	−½	98½—99½
1,895,445	"	Jan. 8	3	3	Do. 3 p.c. Deb.	59—62	..	61½
734,000	"	Sept. 11	6½	6½	Do. 6½ p.c. Red. Deb.	105—107	+1	105½
91,500	"	Aug. 28	8½	8½	South Shields Con.	139—141	+2	..
1,187,795	"	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	103—110	..	109
368,837	"	Dec. 18	5	5	Do. 5 p.c. Deb.	97—100	..	..
647,740	"	Nov. 6	5	5	South'mpt'n Ord. 5 p.c. max.	83—86	..	..
121,275	"	Dec. 18	4	4	Do. 4 p.c. Deb.	72—77	..	..
250,000	"	Aug. 28	7	7	Swansea 7 p.c. Red. Pref.	104—106	+2	105
200,000	"	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	..
120,000	"	Feb. 19	8	8	Tottenham District A 5 p.c.	116—119	..	117—118
882,275	"	"	6½	6½	Do. B 3½ p.c.	100—103	..	100½—101½
181,255	"	Dec. 18	4	4	Do. 4 p.c. Deb.	75—79	..	..
258,251	"	Aug. 28	7/14/4	5	Tynemouth Con. and New	85—87d	..	..
187,294	"	Feb. 19	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	100—105	..	..
68,330	"	"	5	5	Do. 5 p.c. Pref.	93—98	..	..
91,800	"	"	—	6½	Do. 5 p.c. Maidenh'd	90—95	..	..
					Wandsworth, Wimbledon, and Epsom—			
50,000	"	July 10	9½	9½	Wandsworth A 5 p.c.	138—143	−2	..
255,636	"	"	7½	7½	Do. B 3½ p.c.	117—122	−3	..
108,075	"	"	6/7/9	6/9/6	Do. C	100—105	−2	..
284,880	"	"	6/7/9	6/9/6	New Ordinary	..	..	..
352,000	"	"	7½	7½	Wimbledon 5 p.c.	112—117	−4	116
98,000	"	"	7½	7½	Epsom 5 p.c.	120—125	−2	..
40,476	"	Dec. 18	3	3	5 p.c. Deb.	57—60	..	..

Quotations at:—*a*.—Bristol, *b*.—Liverpool, *c*.—Nottingham, *d*.—Newcastle, *e*.—Sheffield. * Ex. div.

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(*Continued on p. 556.*)